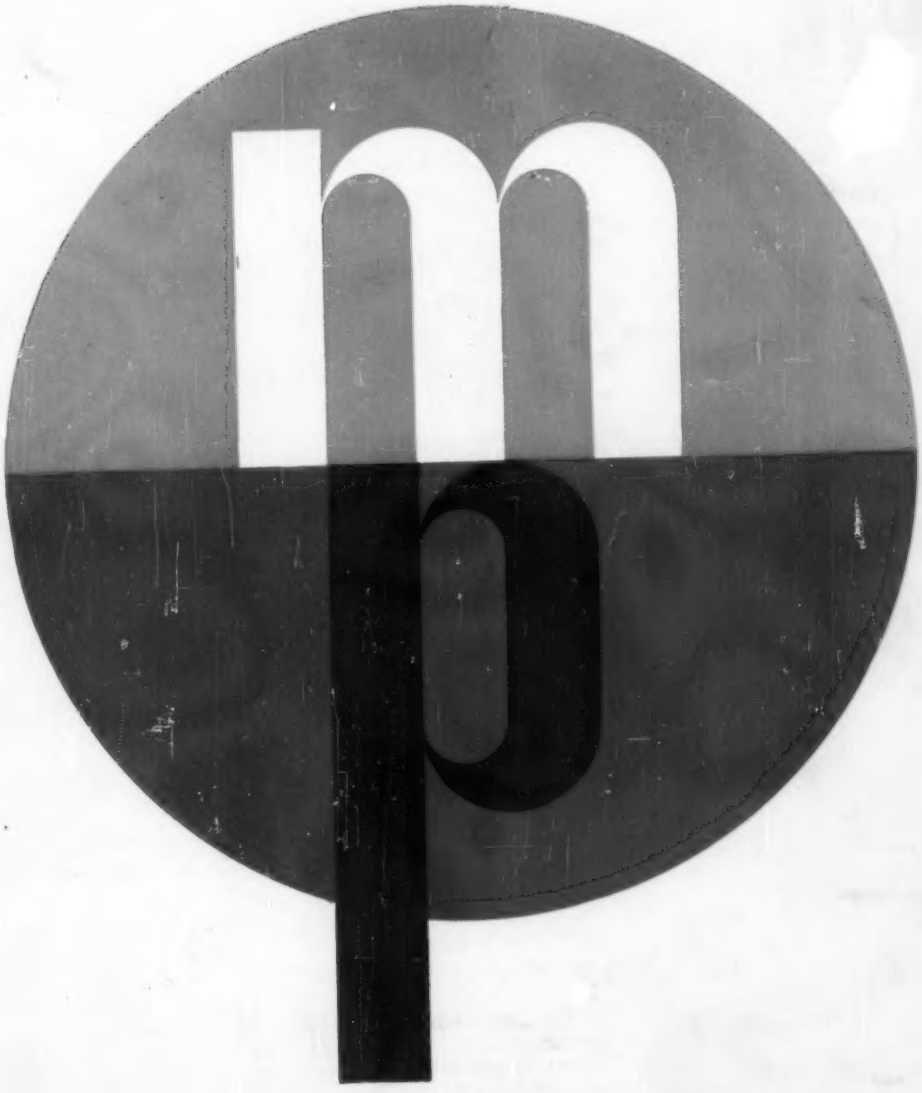
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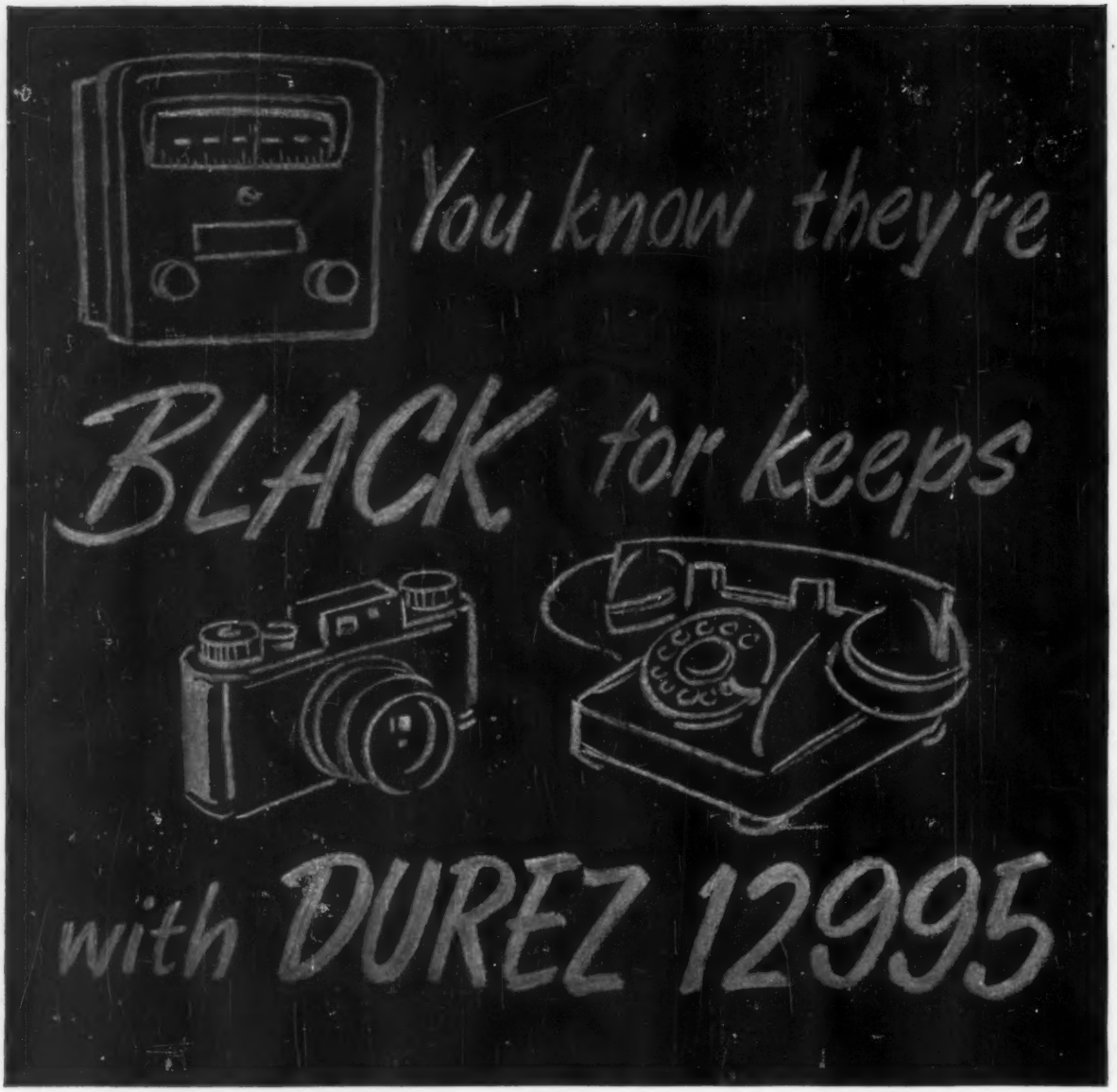
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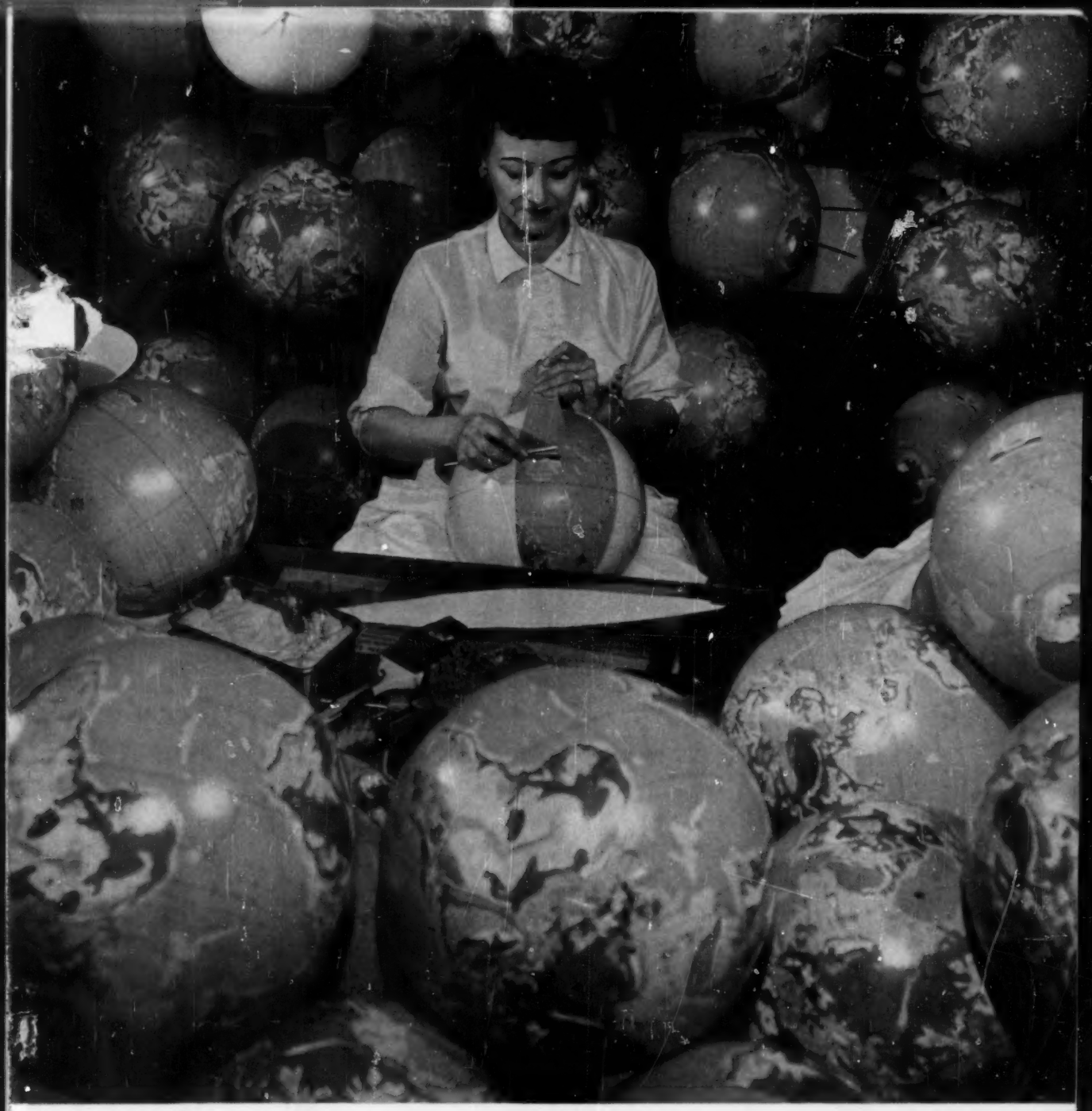
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Editorial

Predictions for 1957

Current trends in materials research, in plastics application, and in processing reported in this issue naturally lead to speculation about the future. A few of these trends, affecting marketing, product design, and process engineering, are so well established that predictions may be made.

First, is the trend toward alloys and copolymers in all polymeric thermoplastics, to provide specific properties for specific purposes.

Second, is the trend toward the greater use of plastics, especially films, in agriculture, and in construction.

The third trend is obvious in the intense interest in composite structures, in sandwiches, foams, and honeycombs being evidenced in the building field, in the transportation field, and in the refrigeration field.

Fourth is the market trend toward plastics disposables, aside from packaging.

Fifth is the matter of large moldings and formed parts for housewares, appliances, and furniture.

Sixth is the emphasis on standards in every big use bracket.

These trends are pointed up in detail elsewhere in the feature articles in this issue, along with the following trends in processing and equipment:

Injection molding: automation, now effective on 2 and 4-oz. machines, will probably be adapted to 8 and 12-oz. units, resulting in a bigger market for the versatile middle-sized machines.

Extrusion: improved heat controls, better die design, crosshead extrusion, and tandem extrusion are leading to improved sheet materials and films—and to fantastic widths of both, making for economy and for new applications.

Thermoforming: the work being done on plug-assist and air-slip forming will provide for deeper draws at lower cost, while full automation will be developed for production of small pieces.

Compression molding: recent emphasis on accurate preheating of materials especially developed for the process must result in economies and in better molded parts.

Reinforced plastics: pressure preforming and the broader development of reinforced molding compounds will open up new fields, may even reactivate huge compression presses now standing idle.

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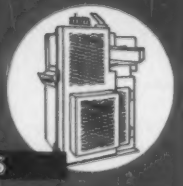
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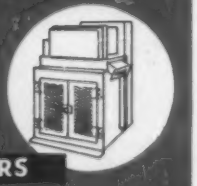
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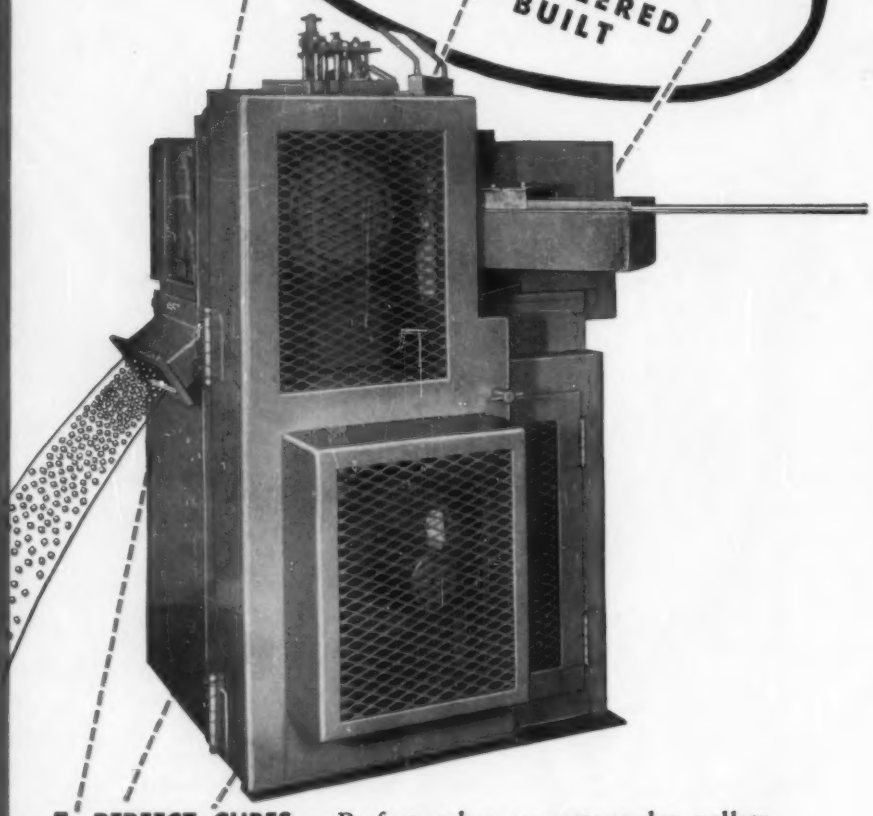
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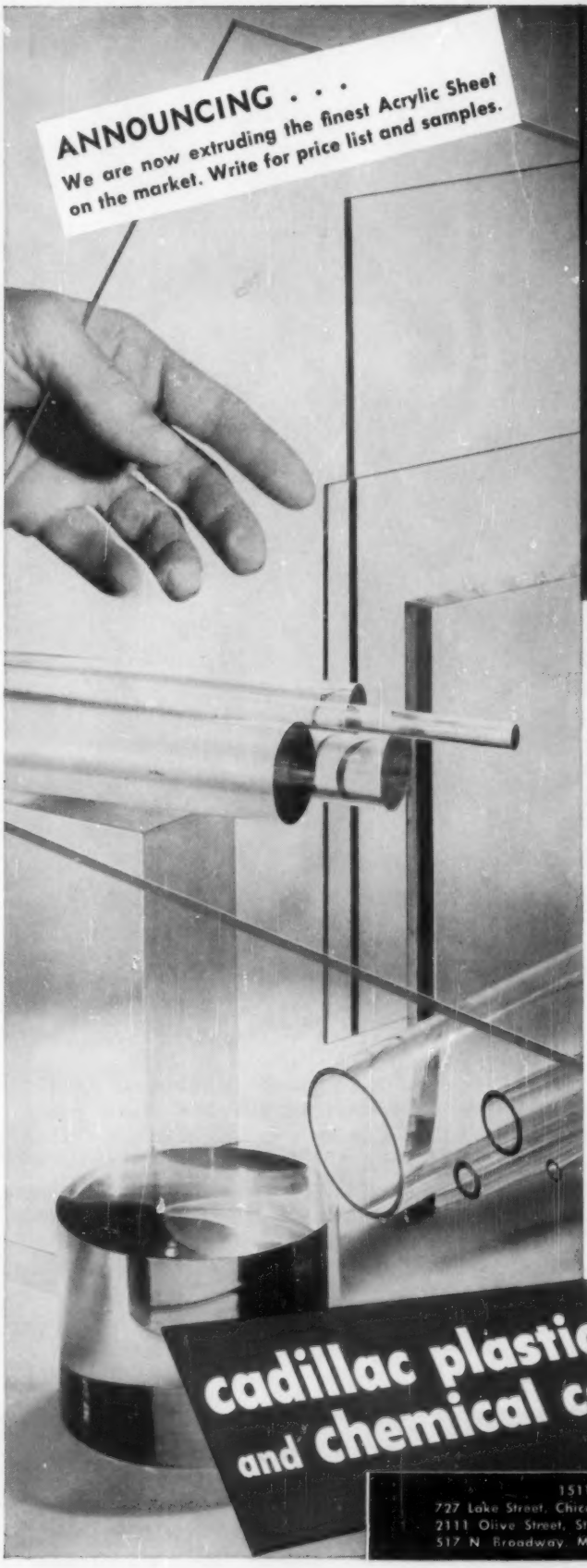
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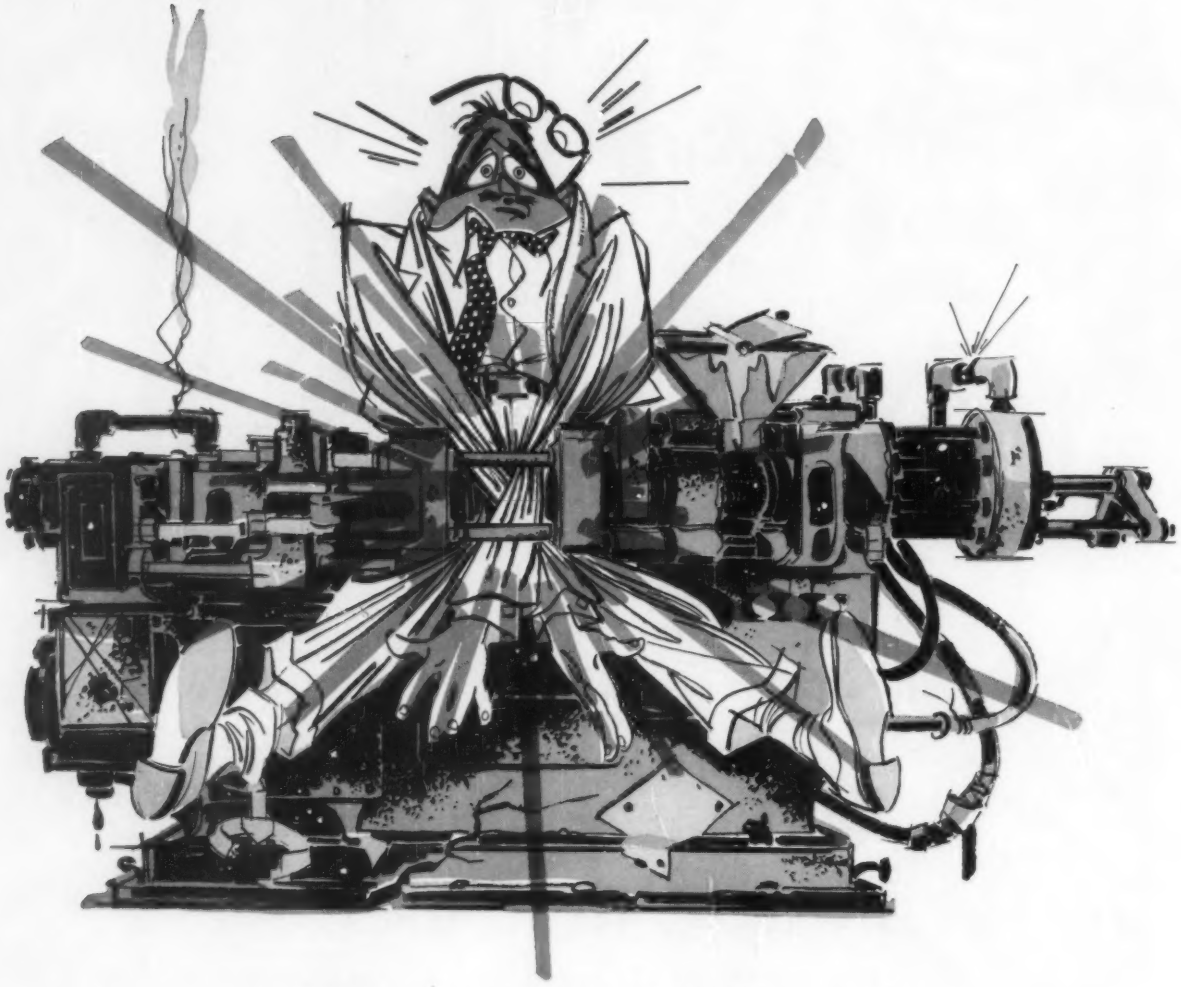
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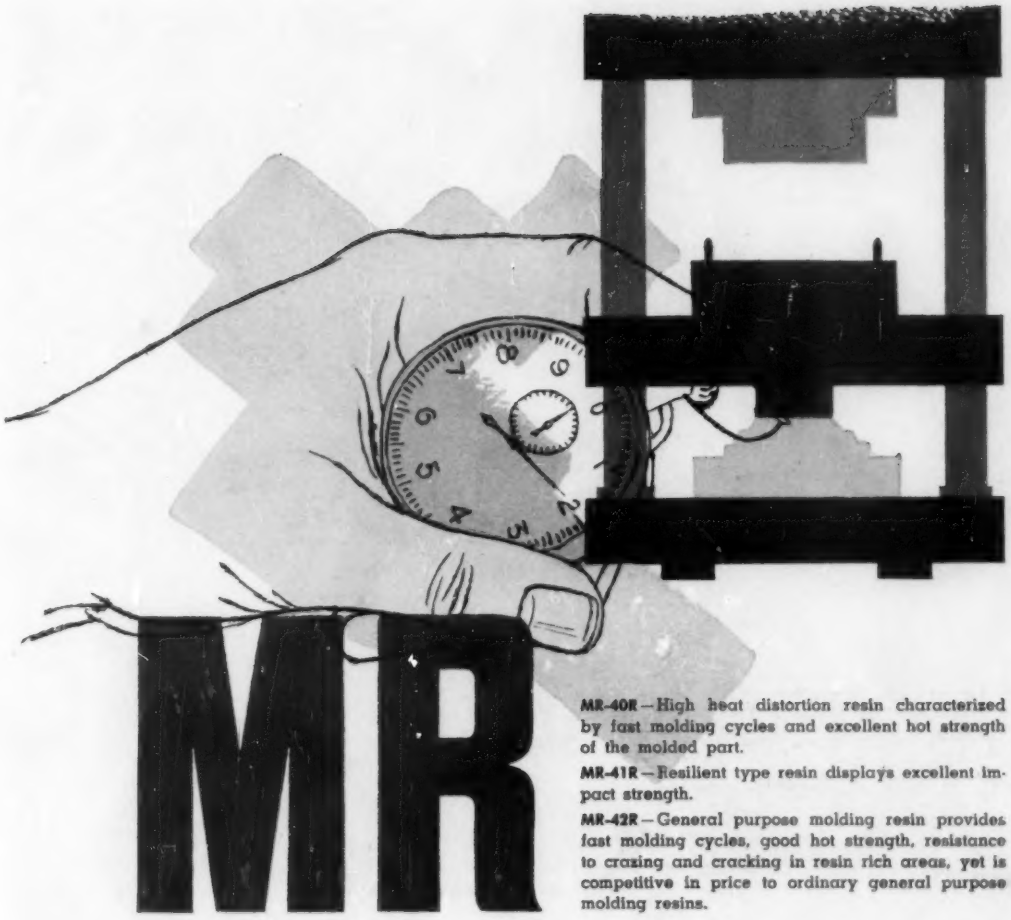
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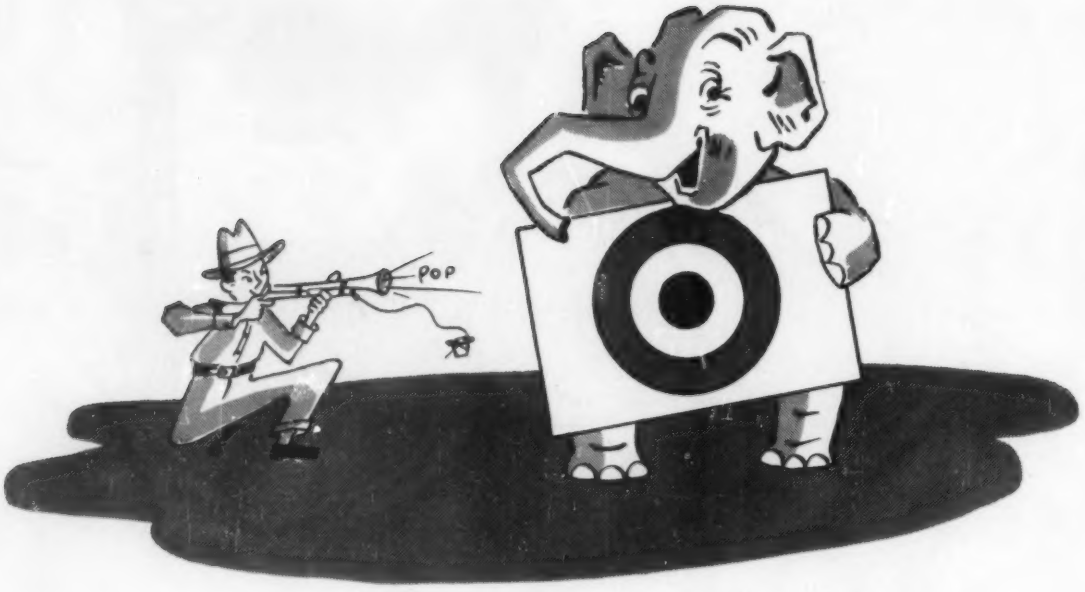
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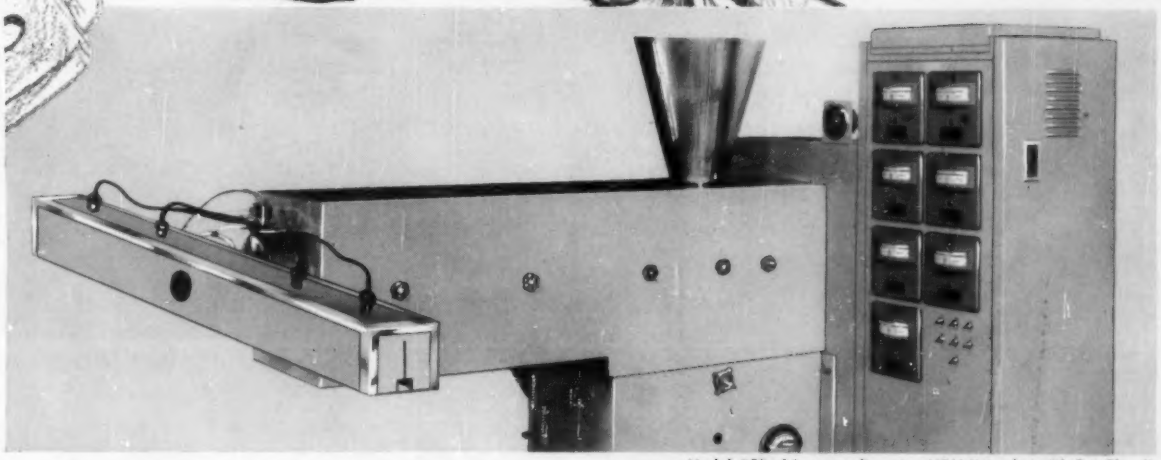
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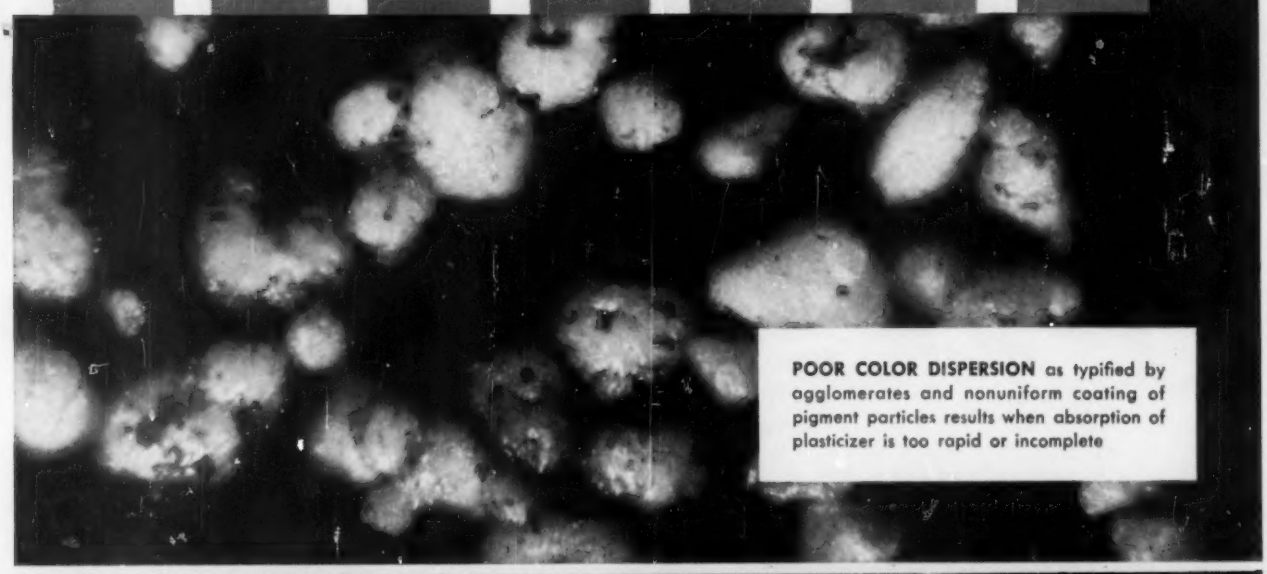
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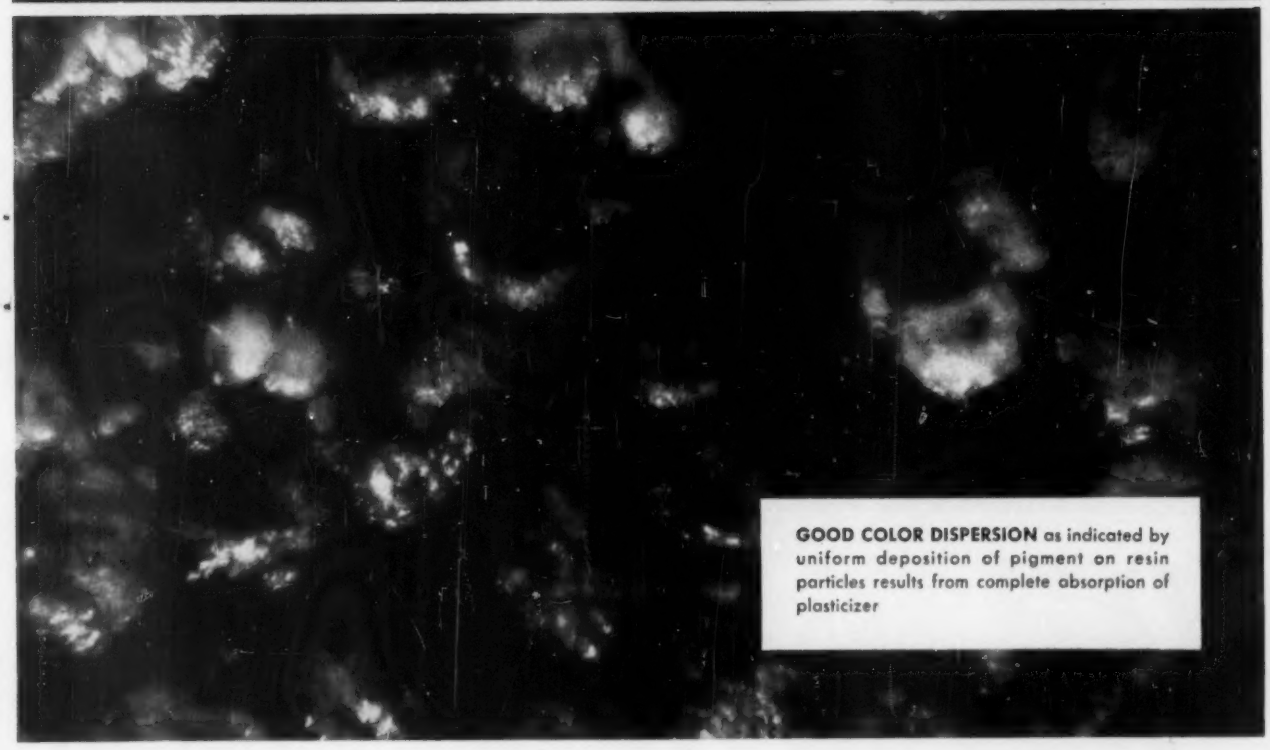
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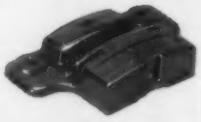
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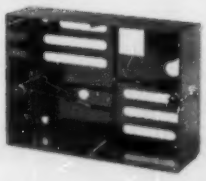
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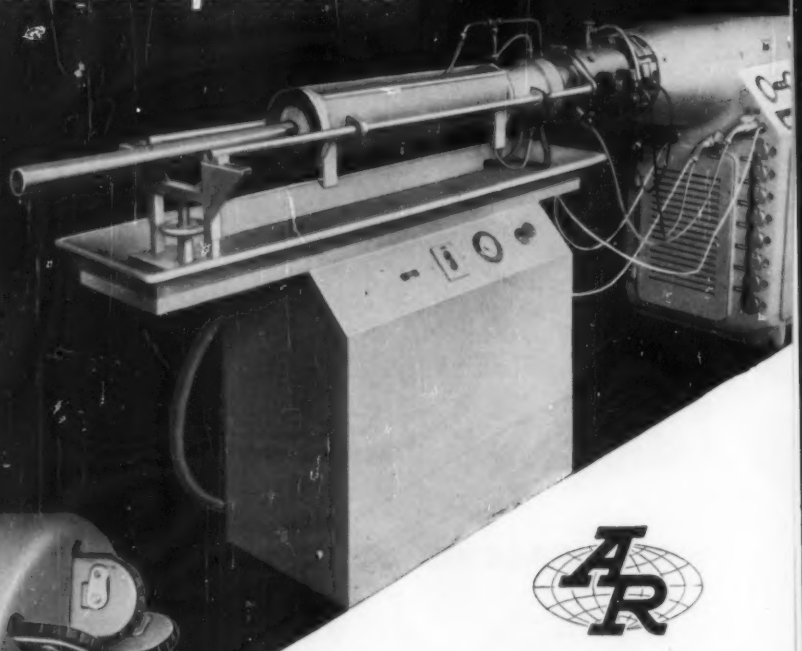
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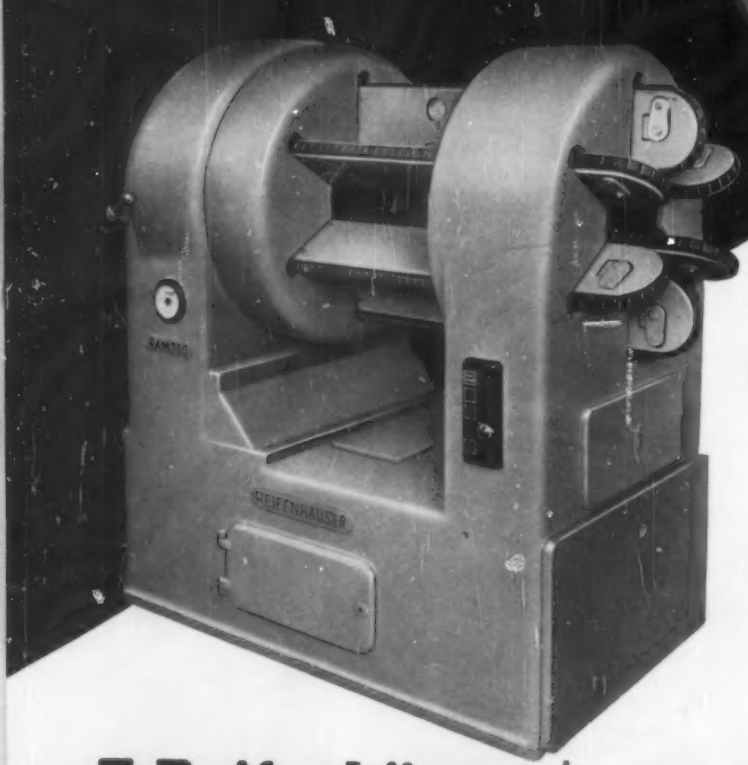
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TWO advances in processing thermoplastics



1. **Calibrating device**
   patents applied
2. **Pipe and cable haul off**
   patents applied



Both of these new technical developments ease the manufacture of thermoplastic pipes by extrusion.

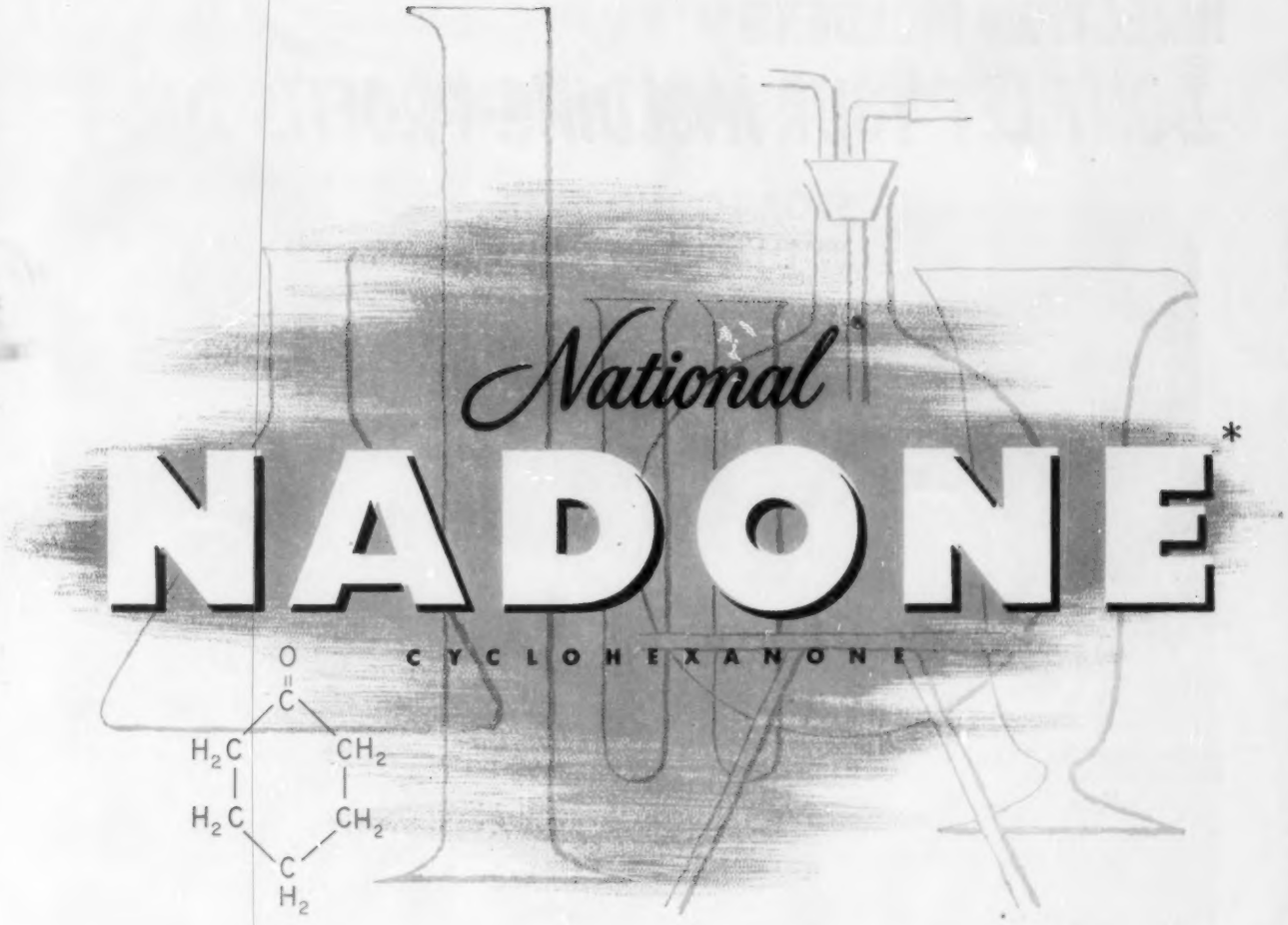
1. The calibrating device guarantees pipe true to size and shape when forming the extruded raw material. With this device the still soft section of the pipe is sucked to the inside wall of the calibrating device and cooled. In this way the thermoplastic material while passing through the calibrating chamber hardens into exact size and round shape required.

2. The pipe and cable haul off grips the pipe securely by six or three rubber covered catterpillar tracks set at an angle of 60° or 120° and pulls in keeping with the extrusion speed. The long working face of the catterpillars in firm contact with the pipe gives a high traction without slip and prevents deformation.

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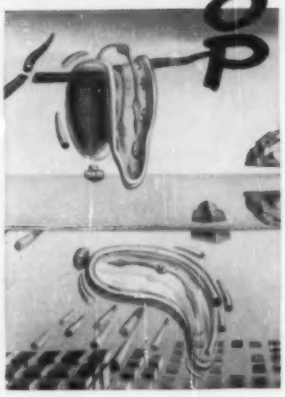
G-6

INJECTION MOLDERS

DON'T LET YOUR MOLDING PROFITS DROOP

STOP LOSING TIME WITH OLD STYLE HEATERS





Here's What IMS REPLACEMENT HEATING CYLINDERS *Will Do for You*

PROVEN IN USE

These inside glimpses of IMS cylinder design explain why more and more molders are replacing old cylinders with IMS Heating Chambers.

IMS Extra Capacity Heaters bring down molding and maintenance costs. Reeds, Watsons, HPM's, Impco, Fellows and many other machines -- over 700 in all -- in sizes from 4 to 85 ounces, are now equipped with IMS Long-Life Superheaters.

SIMPLICITY IN CONSTRUCTION

Our three heater sections (front, spreader and rear) require a minimum of critical tolerances. Ample seat area is used, but seats are not so wide as to spread the available load too thin. Perfect registers, self-reenforcing overlap at joints, with correct crown on seat are the secret of IMS leakproof seals.

There are no sleeves -- no gaps -- no press fits to interfere with uniform heat transfer, or to expand unevenly, causing leaks or hot spots.

STREAMLINED DESIGN

Integral Spreader Unit permits maximum internal streamlining consistent with elimination of sharp fins or points where burning can occur. Uniform flow through IMS Heaters is assured because all internal sections are designed to pass material evenly -- no place for plastic to stick or lag. Heated spreader unit is the most efficient plasticizer commercially available today!

LEAKPROOF WELDS

IMS uses a special HOOK JOINT weld that locks the cylinders together far tighter than is possible with bolts or threads. Our Hook Joint holds better because it is located closer to the seat area than any other fastening method, and eliminates most of the leverage that starts leaks in other cylinders.

CUTS REPAIR COSTS

Repair costs are usually one-half to one-third less than with other cylinder types. And cylinder life is usually from 2 to 5 times that of most original equipment units. Year in, year out your downtime is less with IMS Leak-Proof Replacement Cylinders.

There's New Profit in Old Presses with IMS Extra Capacity Superheaters

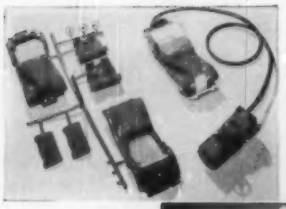
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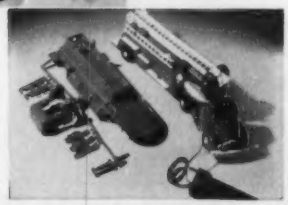
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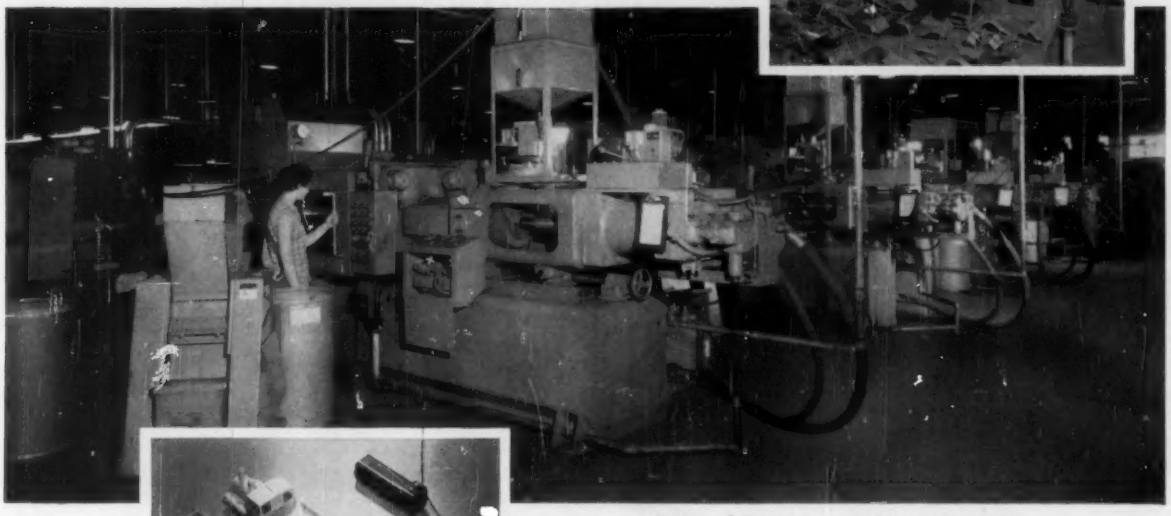
M G Sports Car



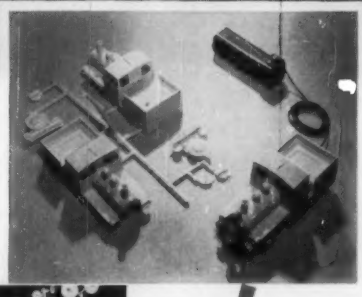
Fire Truck

Molding toy sports car on H-P-M 12 oz. machine.





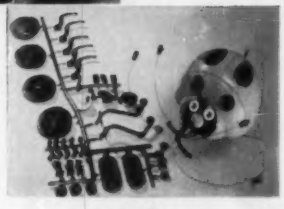
Battery of H-P-M 12 oz. machines at General Molds and Plastics Corp., Leetsdale, Pa.



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Electric Toy Gun



Brainy Bug

At General Molds and Plastics Corporation, Leetsdale, Pa. a battery of H-P-M 12 oz. injection machines, using family type molds, turn out the extensive line of Andy Gard remote control electric toys. What makes the H-P-M "12" ideal for this type molding is that it's fast . . . has extra large platens for family type molds . . . plenty of daylight and stroke . . . and straight line hydraulic mold clamp for quick and easy set-up. "We've gone 100% H-P-M in our new plant," says Jim Giardina, Manager, "because H-P-Ms have everything a molder could ask for." There's plenty of reasons why so many plants go H-P-M "all the way". Send for the complete story of the H-P-M line, today.

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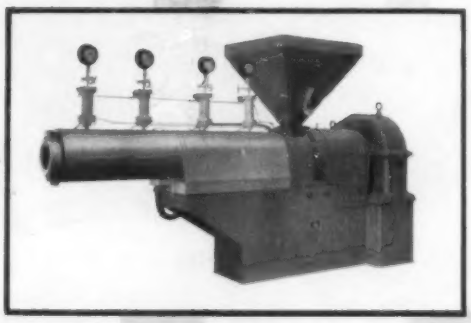
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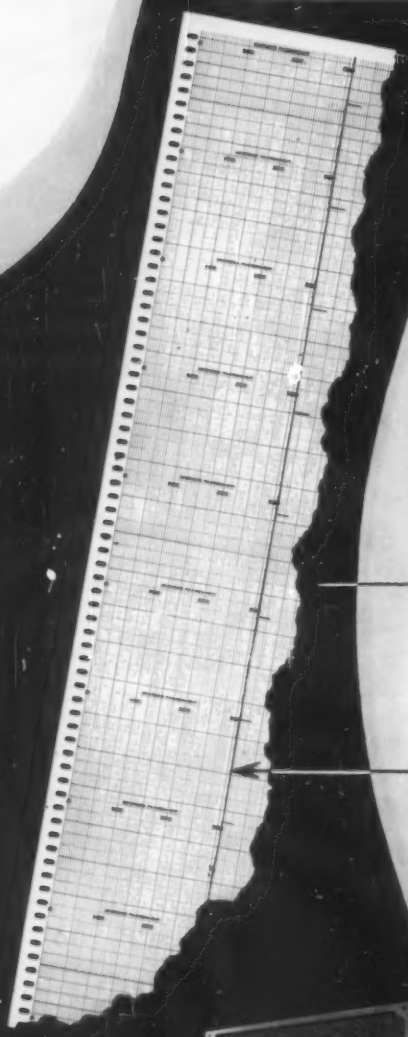
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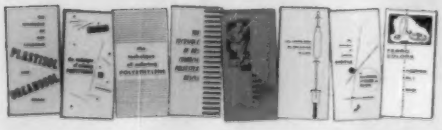
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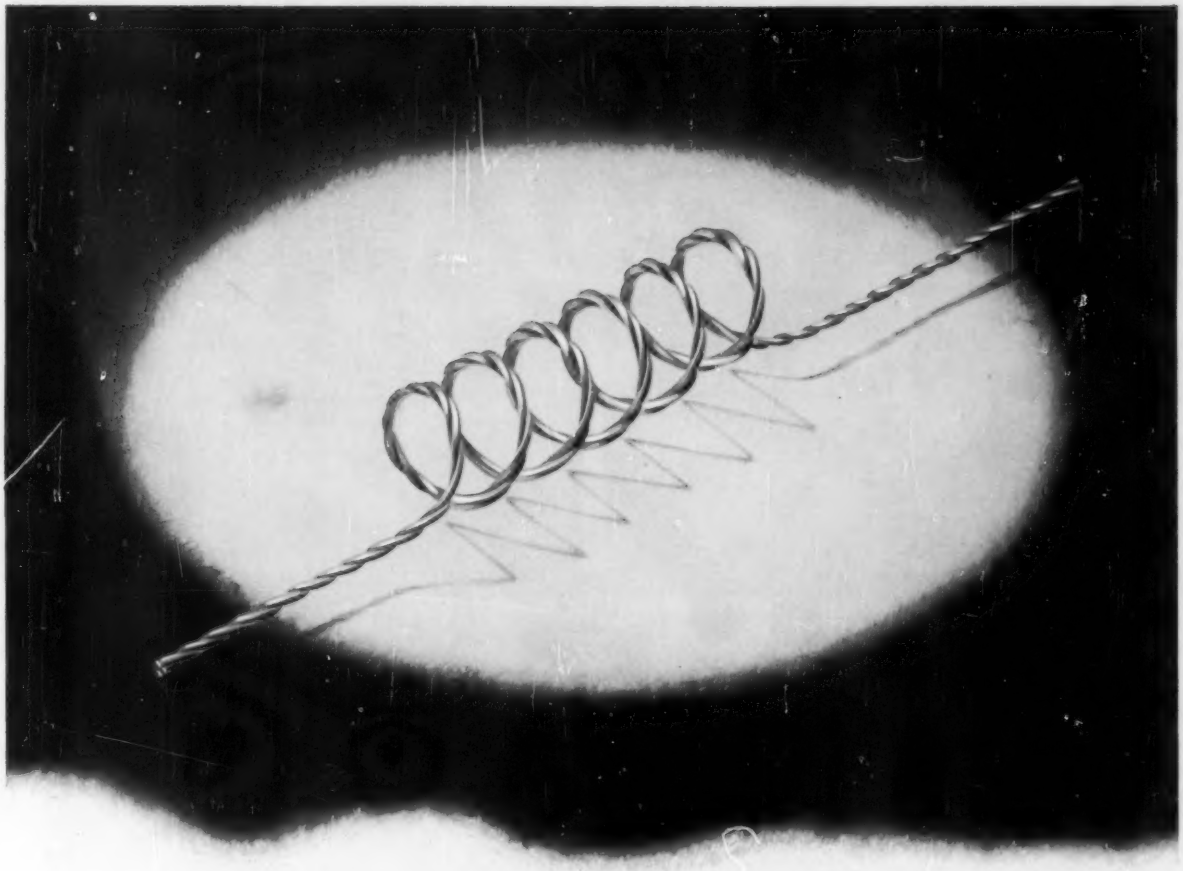


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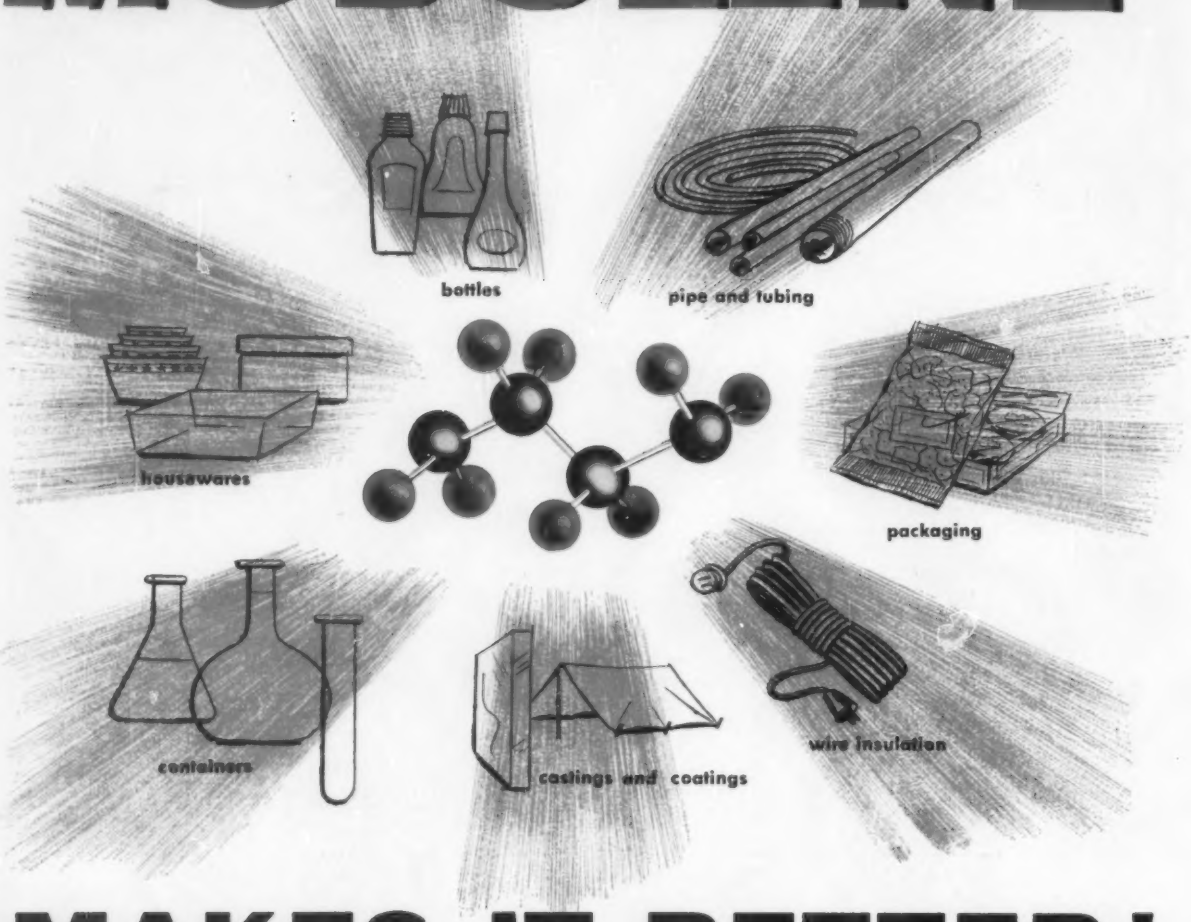
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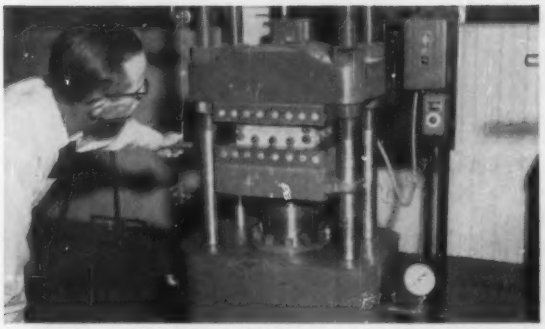
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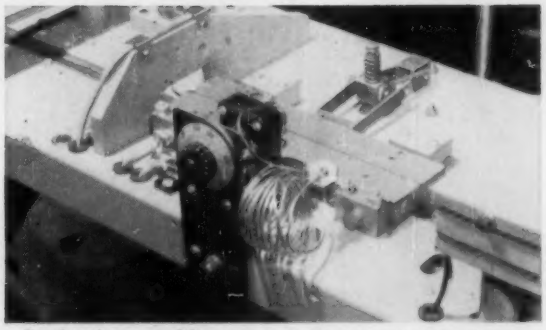
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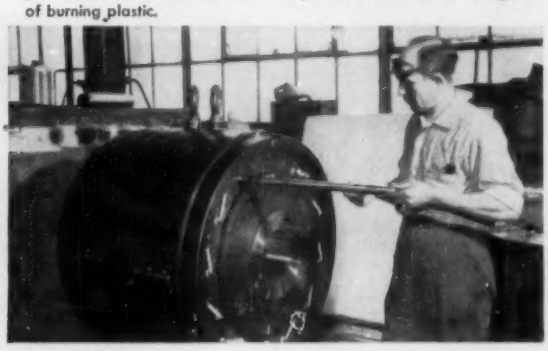
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Spring strain reliever for applications in which heater leads flex. High tensile spring, mechanically locked to heater, covers lead wires a distance sufficient to distribute stress.

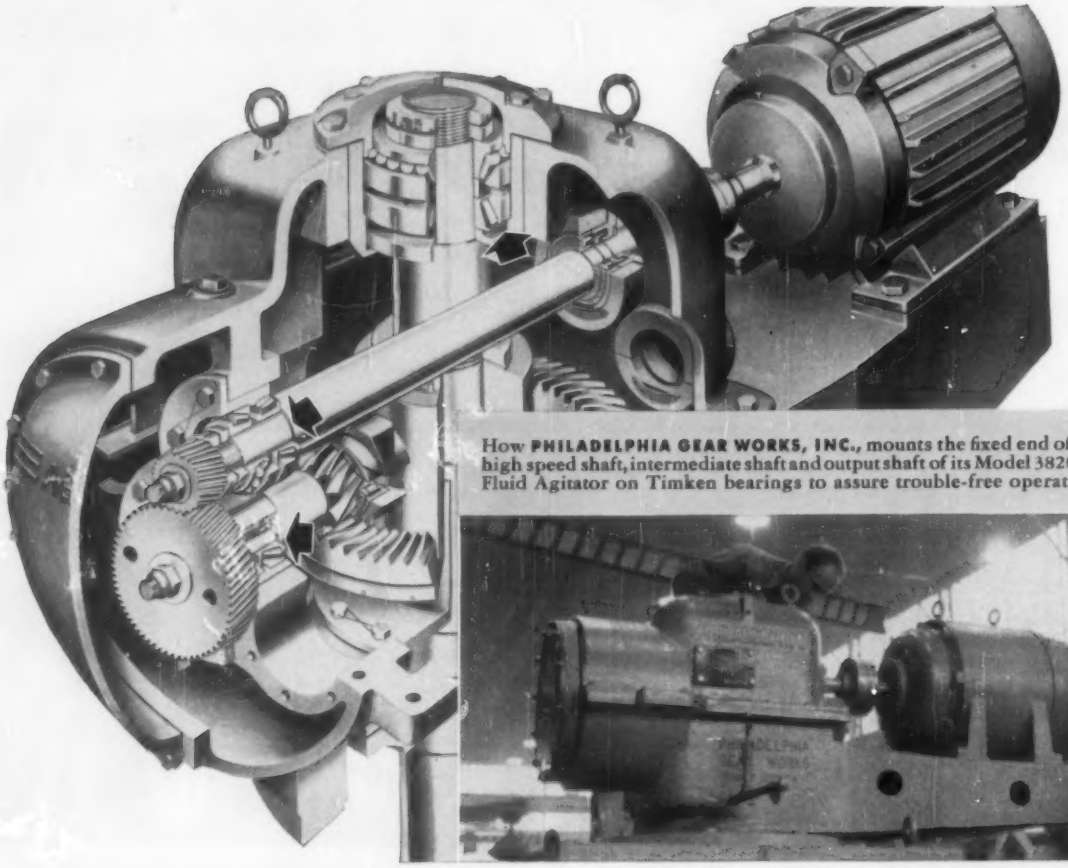
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Flexible brass conduit protects lead wires against abrasion from other moving parts and from accidental mechanical damage. Safety factor where lead wires are exposed to machine operator.

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Timken bearings' tapered construction lets them take both radial and thrust loads in any combination. And they give you extra load-carrying capacity, because of full line contact between roliers and races. Gears mesh more smoothly, more accurately. Shaft wear is eliminated. Gear wear is reduced.

And Timken bearings practically eliminate friction. They're geometrically designed to roll true, made microscopically accurate to live up to their design.

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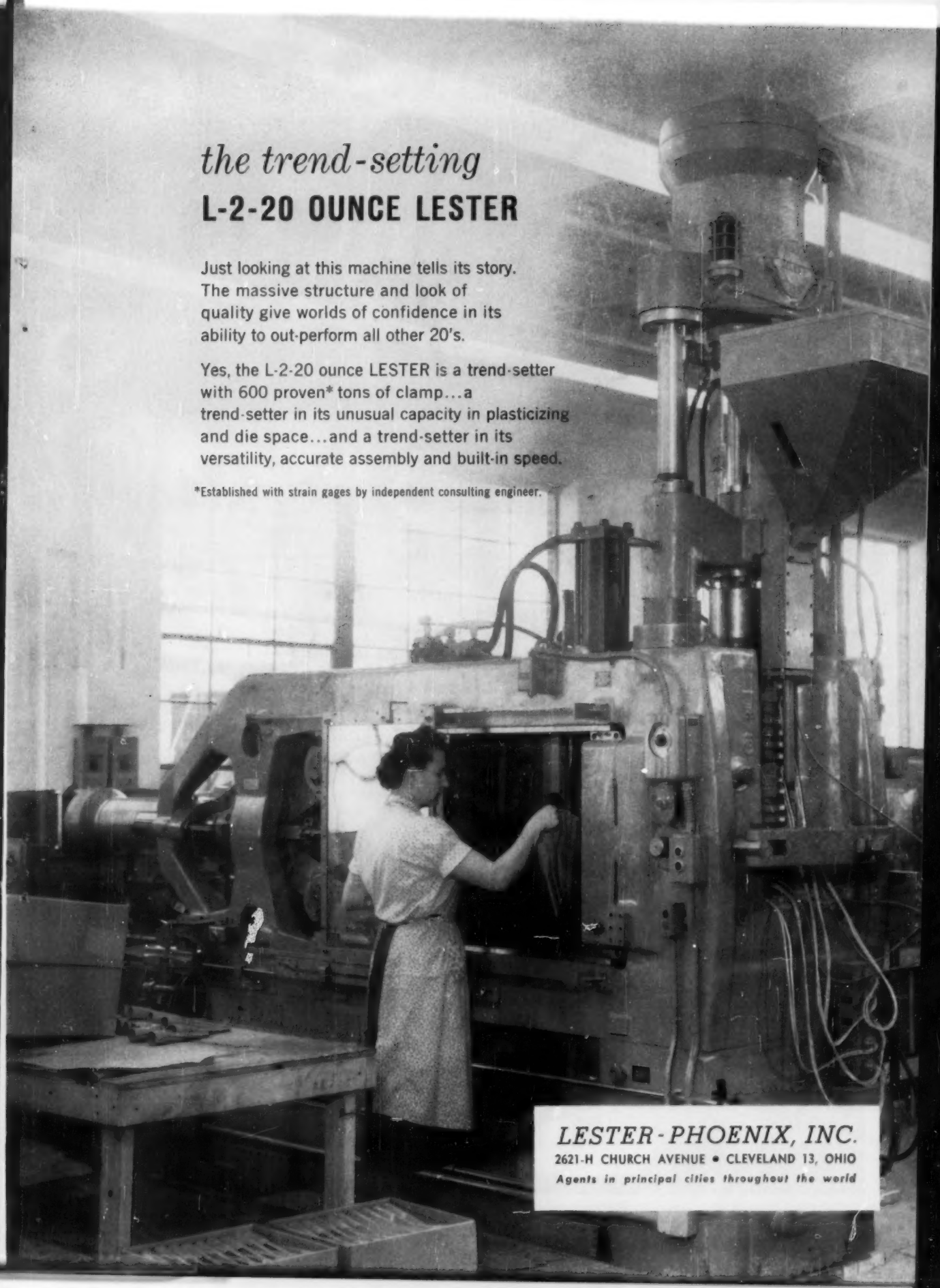


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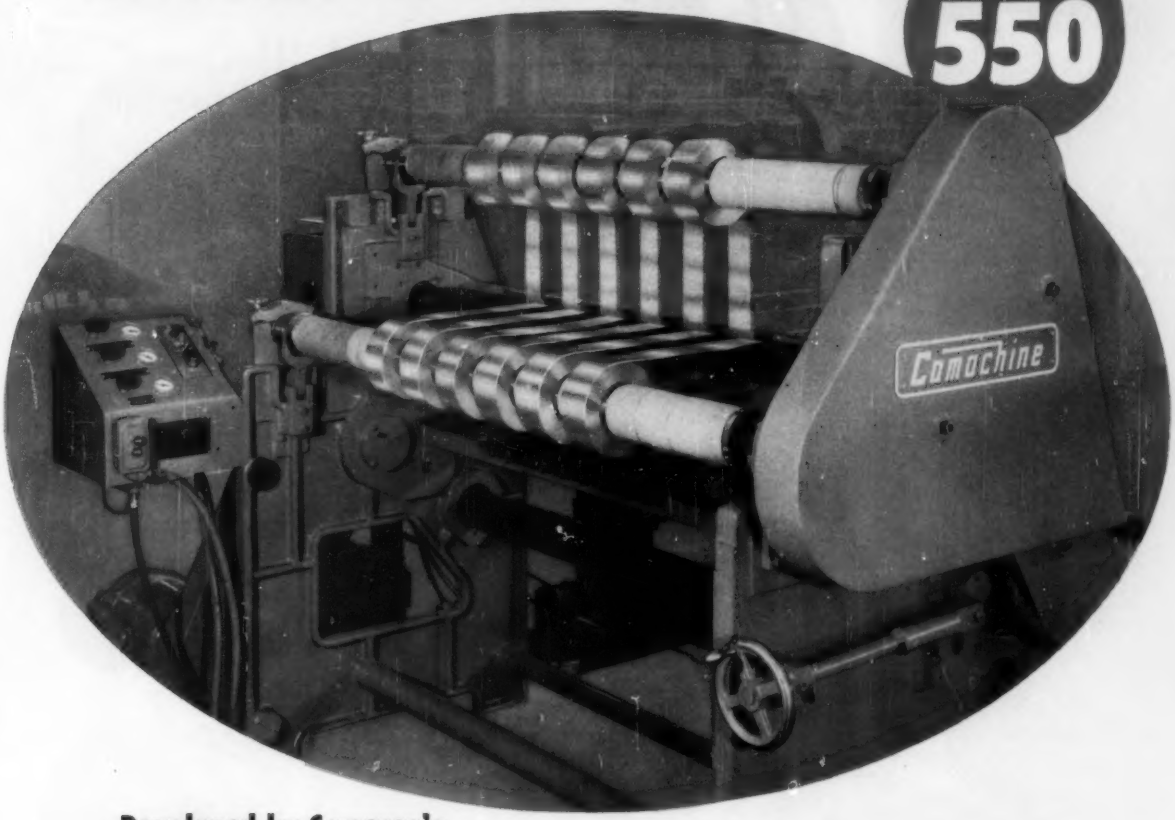
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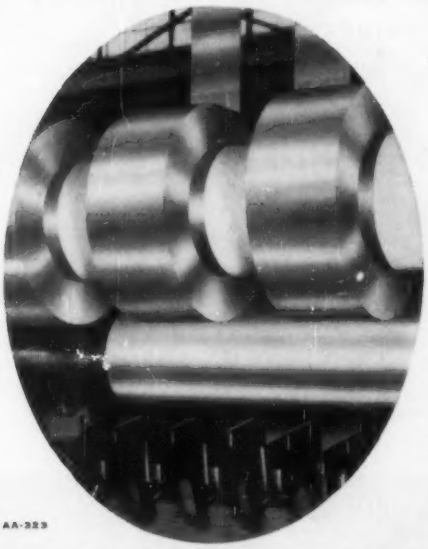
CAMERON *presents the new* Model 550



Developed by Cameron's

team of specialists

to meet the popular demand for a light, versatile, low-cost slitter-rewinder



AA-323

. . . a center winding model for handling plastic films, foils, paper, laminates and other materials, incorporating many of the features of larger Cameron machines.

. . . speeds up to 500 fpm*; rewind diameter up to 15″; trim widths of 32″, 42″, 52″ or 62″. Uses differential type rewind shafts with provision for air-loaded core friction.

. . . centralized control panel provides easy operation and eliminates guesswork in setting rewind core pressure and unwind tension. Assures finished rolls that meet the highest standards of quality.

. . . may be equipped with either razor-cut, score-cut, shear-cut or burst-cut slitting units. Optional equipment includes a built-in automatic edge guide to minimize trim waste.

. . . developed by Cameron's *team of specialists*, applying the know-how gained through fifty years experience in the design and manufacture of slitters and winders.

**Speed depends on machine width, number of cuts and character of material.*

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For an exact measure

of dependability . . .

- Excellent machinability
- Superior polishability
- Uniform hardness throughout
- Heat treat hazards eliminated

Cascade

plastic mold steel



Selected by

the molder . . .

World's largest producer of Plastic Housewares

COLUMBUS PLASTIC PRODUCTS, Inc.

COLUMBUS, OHIO

Makers of Lustro-Ware plastic housewares

the mold-maker . . .

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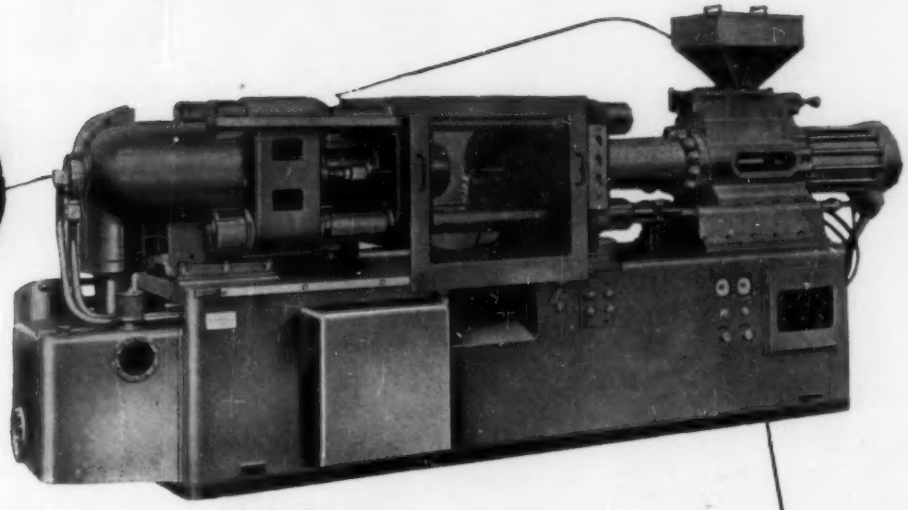
Because of its over-all dependability, Latrobe's Cascade pre-hardened mold steel is the choice of leading molders and mold-makers throughout the plastics industry. Cascade's uniform hardness, superior machining and finishing qualities, and excellent weldability, make it the finest steel for quality plastic injection molds.

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STEEL COMPANY
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INJECTION MOULDING PRESSES



These Machines mean BUSINESS for you

Injection Presses
Negri Bossi injection presses feature maximum serviceability—cylinder, screw, nozzle, and heaters can be removed as units by just one person. Main components are interchangeable. All machines are equipped with oildynamic power drive unit and a special safety device. Model NB 360/520, 12 to 19 oz. capacity shown above.

"Rapid" Fully Automatic Injection Presses
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Extruders
Negri Bossi single screw extruders are available in the "Standard" series with 1 3/16, 1 7/8, 2 3/8 screw diameters, and the "TV" series of variable-speed models with 1 7/8, 2 3/8, 2 3/4, 3 1/2 inch diameters. Screw and die heads are available in a variety of designs for such applications as tubing, profiles, wire coating, monofilaments, and for extruding and blowing PVC and polyethylene tubular films.

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Patented movable and adjustable infrared heater elements concentrate heat where it is needed most, ensuring constant cross-sections throughout the formed piece and permitting extremely deep draws.
Negri Bossi features automatic and semiautomatic machines—both lines providing high quality performance.

EXTRUDERS AND EQUIPMENT



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New Polymeric Plasticizer speeds vinyl production



Eastman
CHEMICAL PRODUCTS, INC.
KINGSPORT, TENNESSEE
subsidiary of Eastman Kodak Company

Eastman NP-10 gives you

- Faster compounding
- Excellent permanence
- Lowest color

In selecting a polymeric plasticizer, vinyl compounders need compromise no longer between desired permanence characteristics and the rate at which such plasticizers can be compounded. Heretofore, permanence characteristics of available polymeric plasticizers have been a function of their molecular weight—with the high molecular weight compounds providing the best in permanence properties. On the other hand, as molecular weight increases, activity decreases, and hence production rates fall.

It is here that Eastman's new Polymeric Plasticizer NP-10 makes its greatest contribution. It exhibits the superior permanence properties of the higher molecular weight materials, yet is itself a compound of relatively low molecular weight. As a result, vinyl compounders can use NP-10, without modifiers, to achieve superior permanence while maintaining efficient production schedules. There's another dividend, too—Eastman Polymeric Plasticizer NP-10 has an APHA color rating of less than 100, a "first" in the field of polymeric plasticizers.

Key to this Eastman development is the use of neopentyl glycol as a base. Unusually stable due to its uniform chemical structure, neopentyl glycol produces polymeric plasticizers which possess outstanding permanence at only moderate molecular weights.

Eastman Polymeric Plasticizer NP-10 is a clear viscous liquid. It is highly resistant to hydrolysis, and thus can be expected to remain unaffected by moisture under the most severe outdoor weathering conditions. It produces vinyl films of excellent low-temperature flexibility. Its loss from vinyl films to hydrocarbons, soapy water and activated charcoal is extremely low, thus ensuring complete plasticization throughout the life of the plastic material. As a vinyl plasticizer, Eastman Polymeric Plasticizer NP-10 shows little tendency to migrate to materials with which such vinyls might come into contact. In addition, tests have shown it to produce excellent organisols and plastisols.

For superior permanence coupled with easier and faster processing, investigate Eastman Polymeric Plasticizer NP-10. Write for a copy of our brochure describing this unique new plasticizer. EASTMAN CHEMICAL PRODUCTS, INC., subsidiary of Eastman Kodak Company, KINGSPORT, TENNESSEE.

SALES OFFICES: Eastman Chemical Products, Inc., Kingsport, Tennessee; New York City; Framingham, Mass.; Cincinnati; Cleveland; Chicago; St. Louis; Houston. **West Coast: Wilson Meyer Co.,** San Francisco; Los Angeles; Portland; Salt Lake City; Seattle.

- **MELAMINE IMPREGNATED PAPERS** in a wide variety of patterns, wood grains, solid colors, and translucent overlay grades for durable decorative laminates. Available in rolls slit to width, sheeted, or die-cut to any shape required.

- **PHENOLIC IMPREGNATED PAPERS** for producing N.E.M.A. industrial grade laminates and molded parts for a wide range of electrical, mechanical, and structural applications. Precisely controlled processing assures uniformity of quality.

- **PHENOLIC IMPREGNATED FABRICS** such as cotton duck, cloth, and sheeting for high or low pressure molding. Available in grades to meet N.E.M.A. standards. Also used in producing gears, bearings, filters, helmets, and many other products.

FABRICON

PLASTIC IMPREGNATED MATERIALS

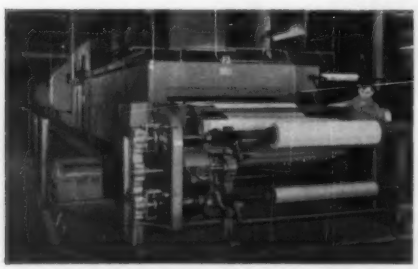
for Molding and Laminating

- **PHENOLIC IMPREGNATED GLASS CLOTH** produced in special grades for fabrication of fly rods, aircraft and guided missile parts, plus many other products requiring a strong, light, durable material highly resistant to heat and corrosion.

- **POLYESTER IMPREGNATED MATERIALS** such as glass fabric and mat for low pressure molding of aircraft parts, tools, and other applications where high strength, light weight, ease of forming, and dimensional stability are essential properties.

- **SILICONE IMPREGNATED GLASS CLOTH** in grades having excellent dielectric strength and resistance to distortion at high temperatures, plus other properties required for applications such as radar equipment, printed circuits, motors, etc.

- **EPOXY IMPREGNATED MATERIALS** custom treated to meet the highly specialized requirements of many electrical and electronic devices used for an ever-increasing number of military and industrial applications.



One of several giant impregnating ovens having roll capacities up to 90" in width. All are designed for continuous quality controlled operation.

Whenever you need plastic impregnated and coated materials, you'll do well *always* to think of Fabricon *first!* For regardless of what your requirements may be, you'll find that Fabricon has what it takes to deliver the quality and service that you've been looking for. Years of experience with all types of thermosetting resins and fillers. Complete engineering and laboratory facilities for developing new products and processes. Special production equipment designed for precisely controlled, continuous, economical operation. Facilities, too, for slitting material to width, sheeting, or die-cutting to any shape required.

Want detailed information on the Fabricon Plastic Impregnated Material that's *right* for your particular product? Just outline the nature of your application and send it in today!

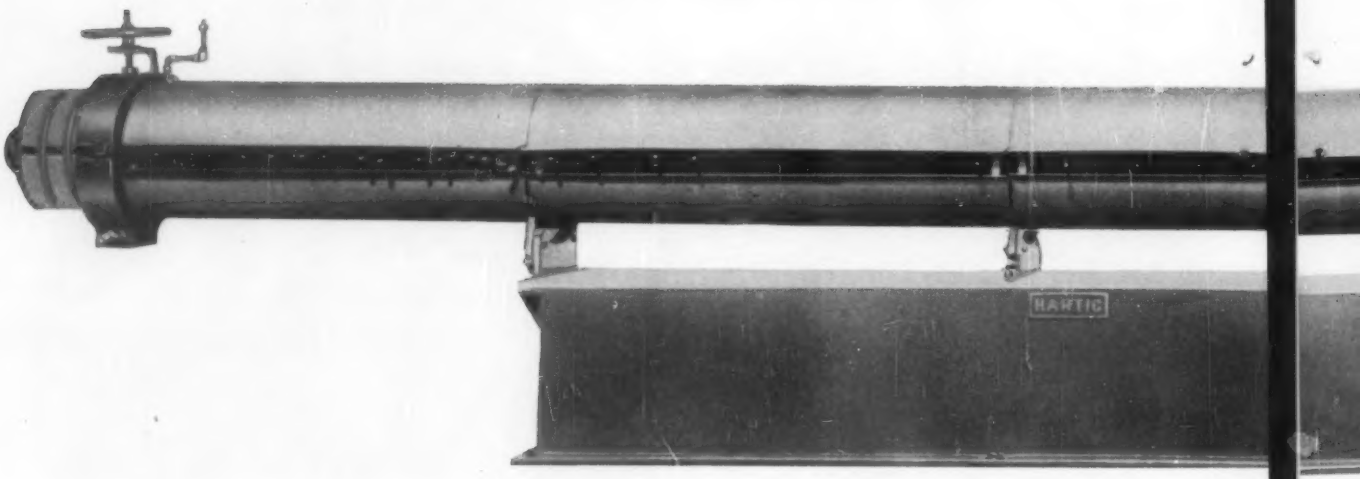
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Another HARTIG first



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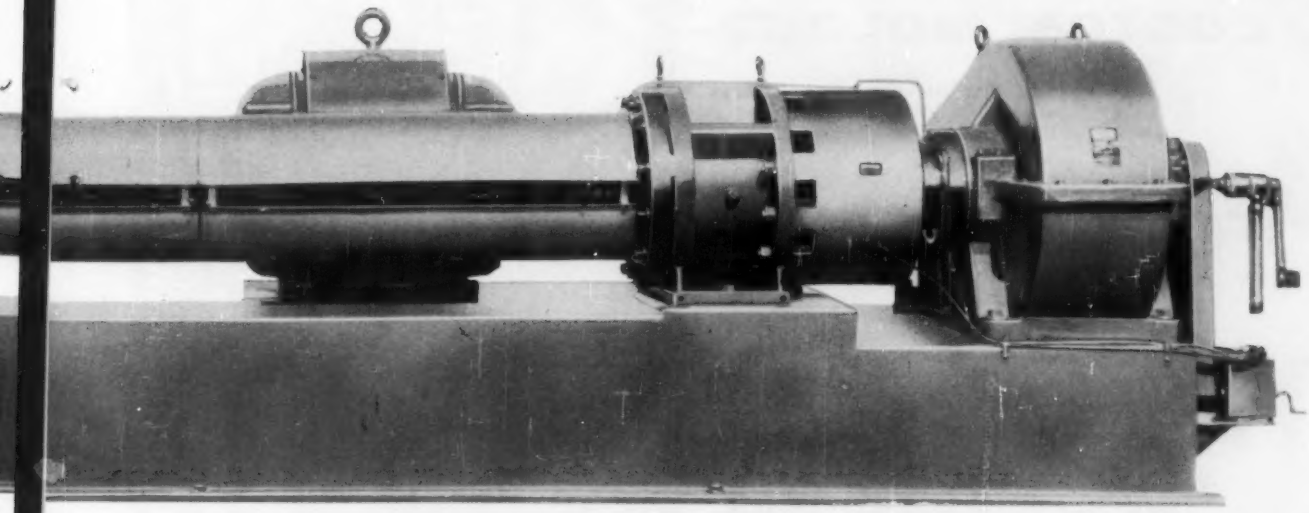
1. **greater pressure stability**
2. **greater output**
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4. **greater temperature range, permitting a lower temperature gradient**



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Designed for Today's Needs... and Tomorrow's

-the 30:1 extruder



This new development is the latest step in the long line of Hartig improvements in extruder design. It reflects Hartig's policy of continuously providing the industry with more advanced equipment for more efficient production. And in addition to increasing the efficiency of current operations, the Hartig 30:1 makes possible the extrusion of materials formerly considered impracticable.

Extruders from 1¼" through 12" bore / L/D 15:1, 21:1, 24:1 and 30:1

Auxiliary equipment includes film and blown tubing dies, take-up units, pelletizers, polishing assemblies.

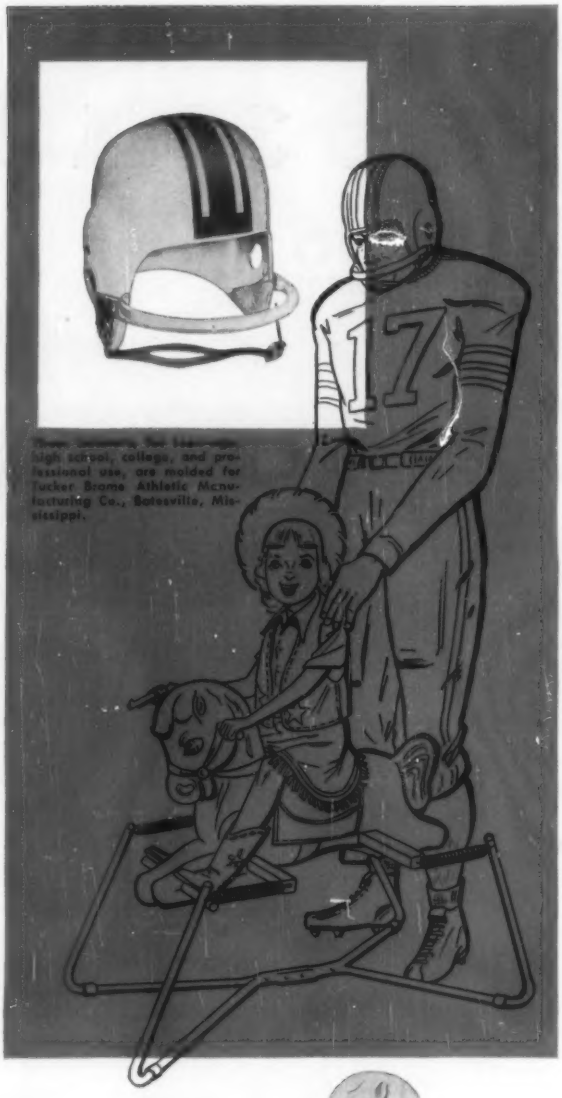
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CUSTOM MOLDED *plastics*
FOR SPORTS AND PLAY



Three versions, for tiny-tot, high school, college, and professional use, are molded for Tucker Brome Athletic Manufacturing Co., Batesville, Mississippi.

PLASTIC products are good only in terms of use. The molder must know the raw materials best suited for each individual application, as well as efficient and economical molding techniques. Here PLASTICS do the job . . . ERIE has the "know-how."

It's hard to tell whether the hobby horse of the lively youngster or the football helmet in battles on the gridiron gets the rougher treatment. Both are practically indestructible.

Ruggedness, a primary requirement, has to be molded into these two tough plastic parts because of the great impact and abuse that each will receive.

Both moldings are produced in our plant at Holly Springs, Mississippi, conveniently located to serve the fast growing industrial South. Regardless of your location, Erie is prepared to produce your custom molded plastic requirements at either our Holly Springs or Erie plant.



"The Wonder Horse, the Original Spring Suspended Hobby Horse," is molded for Wonder Products Co., Collierville, Tennessee.

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to re-create perfect tone . . . EXON 480

typical of the "Pin-Pointed Properties" in Exon vinyl resins

Exon engineers have combined properties so precisely in Exon 480 that they have created the specific resin for phonograph records.

A "biscuit" compounded of Exon 480 assures the finished recording of unusually high tonal quality, as well as breakage resistance.

For production economies, the higher bulking density of Exon 480 speeds banbury output as much as 25%. Other assets: excellent moldability, good heat and light stability, compatibility with vinyl plasticizers, stabilizers and pigments.

Pin-Pointing properties is the Exon way of matching your particular needs with the specific answer in a vinyl resin. The consistent success of fitting the resin to the job has made Firestone Exon industry's most complete source of vinyl resins.

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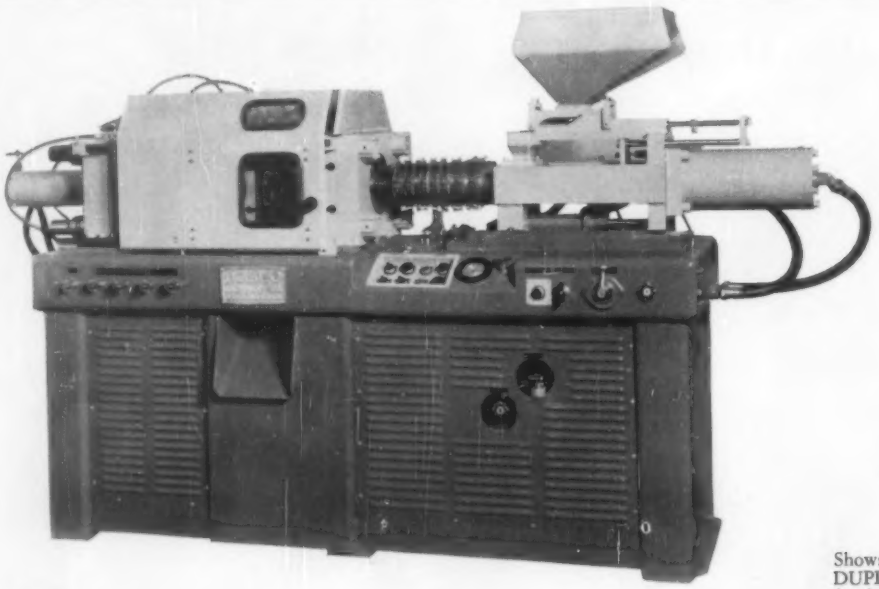
RESINS

For details that will interest you in particular, call or write:

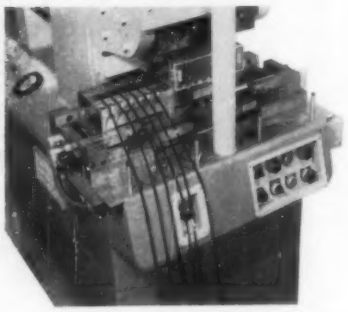
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INDUSTRY'S MOST COMPLETE LINE OF VINYLS ENGINEERED TO YOUR SPECIFIC NEEDS



Shown below, the Moslo DUPLIMATIC—A must for insert molding up to 3 ounces, in all Thermo-Plastic materials.



THE PROVEN WORK HORSE OF THE PLASTICS INDUSTRY

The Fully Automatic

MOSLO 75-8-3

This famous Moslo 3 ounce Injection Molding Machine is setting new highs in production. Actual records show the 75-8-3, outproduces four, 6 ounce machines by 100%, running molds within the capacity of the machine.

BRING YOUR MOLDS TO US . . .
WE'LL SHOW YOU THE RESULTS,
OR WRITE TODAY FOR DETAILS.

The Moslo line includes these models, ideally suited for container molding:

Model 74-7—Super 2 ounce with 7" mold stroke

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Model 75-8—High speed 3 ounce with 8" mold stroke

Model 76-6—Super 3 ounce with 8" mold stroke

Models 10 & 11—Famous Duplimatics for insert molding

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MOSLO MACHINERY COMPANY

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TECHNICAL BULLETIN | CLAREMONT RESEARCH DIVISION

date: JAN. 1, 1957
subject:

VALLEY—GRAVURE—LAMINABLE

THREE CLAREMONT INKS FOR PRINTING VINYLS

All process and blotch colors—rub resistant bronze golds, too.

Claremont vinyl inks are distinguished by dependable, uniform working qualities. They give top quality results with conventional equipment and thinners. Stock formulations for valley, gravure and laminable printing. If your requirements are special, we can develop formulations to meet your needs. Ask for our Technical Bulletins Nos. 309 and 340. Data is ready also on our ink service for polyethylene printing.



PRINTS BY HARTFORD TEXTILE CORP.

CALIBRATED VINYL COLOR DISPERSIONS

For Calendering—Plastisol—Extrusion

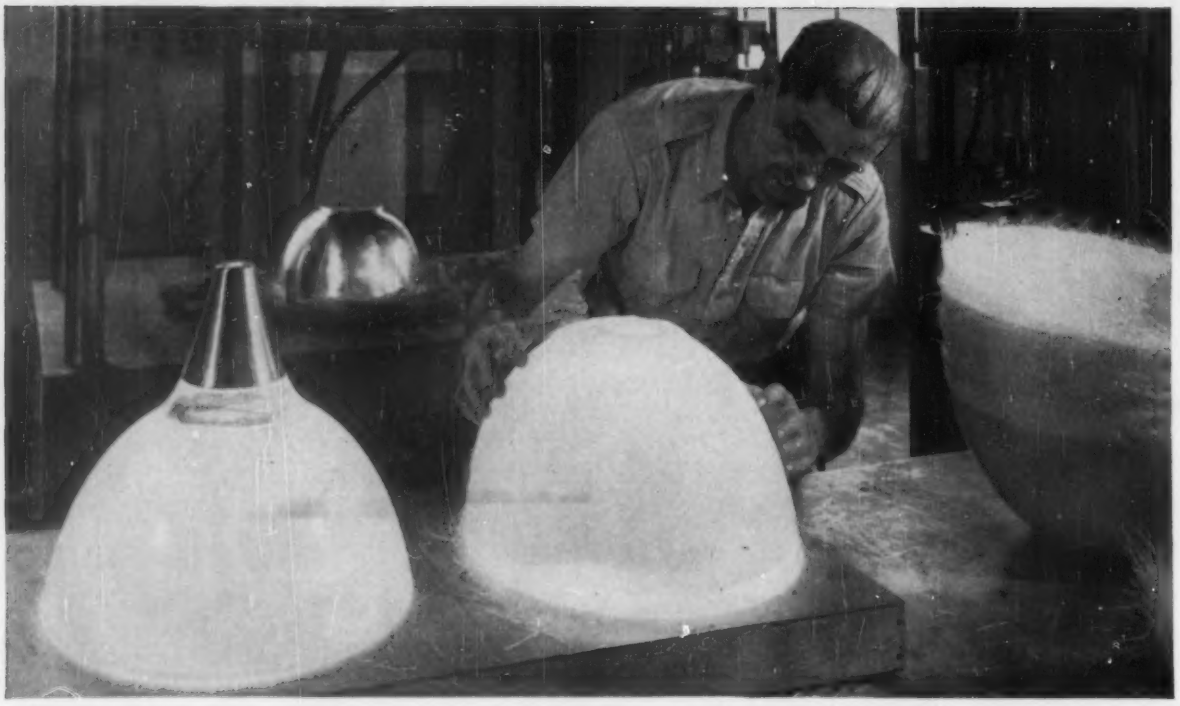
Claremont's system of color calibration, a proven production time saver, enables vinyl calenderers to run as many as eighteen different colors per day without down time. Color range of Claremont dispersions is spectrum wide, includes non-tarnishing metallics also. The data in our Technical Bulletins Nos. 175 and 140 are practical and valuable to vinyl fabricators. Ask for your free copy.

Remember that the formulation of plastic colorants and plastic printing materials—calibration and maintenance of color uniformity—are continuously applied sciences at Claremont.

Claremont is an information and service center on plastic coloring and printing problems.

Our engineering suggestion and advice are always yours for the asking.

CLAREMONT *pigment dispersion corp.* ■ *39 powerhouse road, roslyn heights, l. i.*



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. . . makes your products better—safer—stronger—lighter

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Pittsburgh Fiber Glass offers you exceptional strength, dimensional stability and dielectric strength; it is fire resistant, heat resistant and odorless.

. . . provides a complete range of reinforcements

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TYPE 508 ROVING—Pittsburgh Fiber Glass Type 508 Roving, in addition to general roving advantages, is free of static electricity under widely varying conditions of temperature and humidity during pre-forming operations.

CHOPPED STRAND—Pittsburgh Fiber Glass Chopped Strand is supplied in lengths of ¼" and up—packaged in corrugated cartons for convenient handling.

YARN—Pittsburgh Fiber Glass Yarns are supplied to weavers in all standard sizes—in any twist and ply—plain or with various binders.

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Let us show you how Pittsburgh Fiber Glass can help you produce better plastic products. You can arrange to have free trials made with Pittsburgh Fiber Glass on your products right in your own plant by getting in touch with the Fiber Glass Division of Pittsburgh Plate Glass Company through its main office or any of the district sales offices. *Pittsburgh Plate Glass Company, Fiber Glass Division, One Gateway Center, Pittsburgh 22, Pennsylvania.*

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Thoxane Clamp-Coat, an Epon resin cable splicing compound, produces a weatherproof, abrasion-resistant coating with high electrical insulation. Manufactured by Woodmont Products Inc., Huntingdon Valley, Pa.

- ✓ excellent dimensional stability
- ✓ high mechanical strength
- ✓ outstanding adhesion to metal, glass, plastics
- ✓ exceptional dielectric properties

Although relatively new, the Epon resins have won an important place in electronic and electrical manufacture. Their applications are manifold . . . in printed circuit laminates, transformer and motor sealing compounds, potting compounds for components and subassemblies, protective enamels, adhesives, tool and die materials.

For potting and encapsulating—the excellent dimensional stability of Epon resins, which can, for example, withstand solder bath temperatures without ill effect, and their outstanding adhesion to metals and glass assures airtight enclosure of delicate components and vacuum tubes

As adhesives—solvent-free Epon resin formulations cure at room temperature with contact pressure alone; form powerful bonds between glass, metal, wood or plastic.

As sealing compounds—varnishes and enamels based on Epon resins provide excellent moisture sealing plus outstanding resistance to solvents and chemicals, even at elevated temperatures.

For laminating—Epon resins laid up with inert fibrous fillers produce base laminates that have superior dielectric properties and can be sheared, punched, drilled and bath soldered.

Write for information on the use of Epon resins in electrical and electronic applications.

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SHELL

The Plastiscope*

January 1957

News and interpretations of the news

By R. L. Van Boskirk

Section 1

Polyethylene price changes. Expert manipulation of a slide rule may become necessary to determine the price of polyethylene in all its ramifications if present pricing tendencies are carried much farther. There are now so many variations in prices and materials that a salesman's price list may soon approach the size of a life insurance agent's with a different rate to cover every age and every income.

The latest change (if nothing more happens before this item is printed) was in the price of general-purpose polyethylene from 41¢ minus 5% to 41¢ minus 10%, which amounts to 36.9¢ a pound. Eastman Chemical Products was the first to make it official with a printed price list and other companies followed suit.

The Eastman listing is interesting for more reasons than pricing, since it includes several new formulations not previously announced. Groups I and Ia are the general-purpose materials for molding, extrusion, blowing, film, and paper coating that are subject to the 10% discount. Group I is divided into two different series of formulations called basic and series 61. The basic material is conventional polyethylene; series 61 is modified to provide a more workable material. Group Ia is a material for molding, extrusion, and blowing that sells for 44¢, but, together with all Group I resins, is subject to the 10% discount. All the other groups of materials produced by the company do not carry the 10% discount, but color compounds and concentrates have been reduced from 4 to 5¢ a lb.; for example, the former 50¢ color formulas are now 46 cents.

The new Eastman formulas are a new high-molecular-weight wire covering material at 47¢; a black pipe extrusion grade at 38¢ to compete with another firm's upgraded pipe material that has been on the market for some time; and cellular polyethylene in natural at 53.5¢ and colors or blacks at 56.5 cents.

Higher-density polyethylene film. Polyethylene film that can withstand temperatures of 240° F. and is two and one-half times stiffer than conventional polyethylene can be made from Spencer Chemical Co.'s new high-pressure-processed polyethylene. The new resin from which this film can be made is about .938 density compared to less than .920 for the older polyethylenes. Tradenamed Poly-Eth Hi-D 2504, the new resin is available at 47¢ a pound.

Other important properties are its good slip characteristics, claimed to be superior to unlubricated conventional film, and no blocking. It is less

* Reg. U. S. Pat. Off.

permeable to gases and water vapor and at least three times more greaseproof than conventional polyethylene. It processes normally on conventional equipment. Suggested uses are for boilable bags and overwrap packaging.

Sterilizable polyethylene tubing. Food Film, Inc., Caldwell, N. J., announces a new sterilizable polyethylene food film, Steripol, produced in the same widths as its standard tubing of 2 through 4½ in. and gages from ¾ to 2 mils. It is claimed to be less permeable than conventional polyethylene to carbon dioxide, oxygen, and water, and to withstand boiling. Suggested uses are for frozen foods to be cooked in the package and for materials or instruments which would be sterilized in the package. Steripol is produced by patented methods on special machines developed by Milo R. Gerow and licensed to Food Film, Inc.

Plaskon nylon for extrusion. Development of a new and improved polycaprolactam-type nylon, specially formulated for extrusion and blow molding, has been announced by Barrett Div., Allied Chemical & Dye Corp. Named Plaskon Nylon 8201, it is designed to extend the range of products fabricated from nylon, particularly clear film, and small-diameter tubing and rod. The new material is characterized by its low moisture content, wide range of permissible stock temperatures (450 to 550° F.), and relatively high molten viscosity, all of which help to give improved moldability and extrusion, lower processing temperature, minimized shrinkage in thick sections, and elimination of voids. Bottles of various types, including aerosols, are among the new products where this material is expected to be most useful.

Filled nylon molding material. Molded nylon filled with molybdenum disulfide is being used in 11 different parts of Ratio-Flo aircraft pumps manufactured by William R. Whittaker Co., Ltd., Los Angeles. The pumps are designed to handle fuel at temperatures from —65 to 110° F. Pressure is only 200 p.s.i., but it is claimed that the filled nylon can be used up to 1300 p.s.i.

The new nylon powder, tradenamed Nylatron GS, is distributed by National Polymer Products, Inc., Reading, Pa. One of the parts for which it is used is on the aluminum rotor shaft of the pump, to which it is applied by high-pressure injection molding; its low coefficient of linear expansion and minimum distortion following molding permitted successful molding of the rotor which would otherwise require machining to required tolerances. The pumps are designed to run dry for prolonged periods and the nylon is particularly adaptable for such extreme treatment because of its low coefficient of friction and wear resistance.

Vinyl chloride for surface coatings. An upward trend in the use of vinyl chloride surface coatings has been quite noticeable during the past year. Goodyear is now adding to this trend by bringing out a new organosol formulation based on its Pliovic AO vinyl dispersion resin. The organosol has been developed for use in decorative and protective coating applications on metal surfaces and may be brushed or spray-applied.

The Goodyear organosol is formulated with 35 parts plasticizer and 100 parts resin. Chemically stable pigments are incorporated. The comparatively low plasticizer content is claimed to permit production of a hard coating with less tack and greater chemical resistance than the more highly

plasticized formulations. The material is suggested for coating sheet stock, machine parts, tool handles, metal ducts, hoods, and machine housings.

Goodyear has also announced a $4 million expansion program for its Pathfinder Chemical Corp. plant at Niagara Falls, N. Y.; major portion is for buildings and equipment to produce more of its Pliovic vinyl chloride resins. First of the increased production is expected to come in sometime after July 1957.

Diamond-shaped pellets. Molding powder of Lucite acrylic resin is now being offered with diamond-shaped particles, ⅛ in. long and ⅛ in. thick, by Du Pont. Advantages claimed for the new shape are: improvements in pouring, in handling by pneumatic hopper loaders, and in metering into extruders and injection molding machines; greater shot-to-shot uniformity of injection molded parts; space-saving in packing and storing; slightly greater machine capacity in certain types of extrusion and injection molding machines; approximately 10% higher bulk density than cube-cut powder (the same shipping drums can be used to hold 275 instead of 250 lb.); lower moisture content, making possible processing at higher temperatures without bubbling or splay in molded parts; and a virtual absence of fines, which promotes freedom from discoloration in severe heating cycles.

News from Down Under. Australians and New Zealanders have ideas on plastics applications from both a molder's and consumer's point of view that are sometimes at great variance from those in the United States. For example, British Xylonite (Australia) has molded hundreds of thousands of nylon tap valves for both hot and cold water faucets; once it is installed, there is never a need for the bothersome replacement of washers. It is molded of the "soft" grade Akulon nylon; the softness is required so it will squeeze on shut-off. Another "hot" item is a re-usable ½-lb. candy box for chocolates, molded of opaque polystyrene. It costs much more than a cardboard box, but sales volume of the candy was increased more than enough to pay the extra cost.

One molding plant in Australia with some 30 to 40 presses of 2- to 3-oz. capacity runs all night without a single attendant. It is so contrived that if anything goes wrong, the culprit machine is automatically cut off while the others continue merrily on their way. A New Zealander has made and sold 100,000 pairs of PVC sandals to a population of only 2 million people. The sandals are made with three buckles and can be regulated to the size of the foot; they can be worn in water and are claimed to outwear three pairs of leather sandals.

New plant and process for aromatics. Scientific Design Co., Inc., designers and engineers of organic chemical plants, has disclosed how that firm developed a hydrocarbon oxidation process to produce a variety of aromatics from one feed stock by air oxidation and then sold it to Standard Oil of Indiana which will manufacture phthalic anhydride, isophthalic acid, terephthalic acid, dimethyl terephthalate, dimethyl isophthalate, and benzoic acid.

SDC will design Standard's 60 million-lb. plant for Amoco Chemicals Corp., a Standard subsidiary. It may be that the impact of this process upon the field of aromatic and similar chemicals will be as great as the discoveries in aliphatics whereby ethylene, propylene, and butylene are produced from petroleum. The chemicals listed in the paragraph above may be used for fibers, films, plastics, dyestuffs, resins, plasticizers, elastomers, and

foams. An example is phthalic anhydride which now requires naphthalene, 25% of which had to be imported in 1955.

SDC's discovery of aromatic oxidation stemmed from its search for a new source of terephthalic acid from more plentiful material than paraxylene. The researchers hit upon para-diisopropylbenzene, made from propylene and benzene, which can be directly oxidized with air in one step to terephthalic acid used in the production of Dacron and Mylar.

Most significant part of the discovery is that the same basic plant and equipment can be used to convert these raw materials from one feedstock and produce a variety of products, thus solving the major problem of shifting market and raw material situations.

Koppers' expandable polystrene on the rise. Full-scale operation of a new plant to produce its Dylite expandable polystyrene beads will start in early 1958 at Koppers' Kobuta plant where it has been produced in semi-commercial quantities since 1954. Koppers is also expanding its current semi-commercial plant to take care of increasing demand. Current uses are pipe insulation for air conditioning (MODERN PLASTICS *34*, 49, December 1956), commercial refrigeration, toys and novelties, buoyancy members, sandwich panels, etc.

A most promising new customer for Dylite is the newly formed Dyfoam Corp., New Castle, Pa., which is using the beads to produce 24 in. wide continuous slabs up to any practical length. The planks are sold for insulation in cold storage warehouses, refrigerated trucks and railroad cars, sectional refrigerators, and building or residential construction. An exclusive manufacturing process developed in Sweden by A/B W.M.B. will be used by Dyfoam. The president is Nils O. Ohlson. Lars Norrhede, a Swedish engineer who assisted in the development, is plant manager.

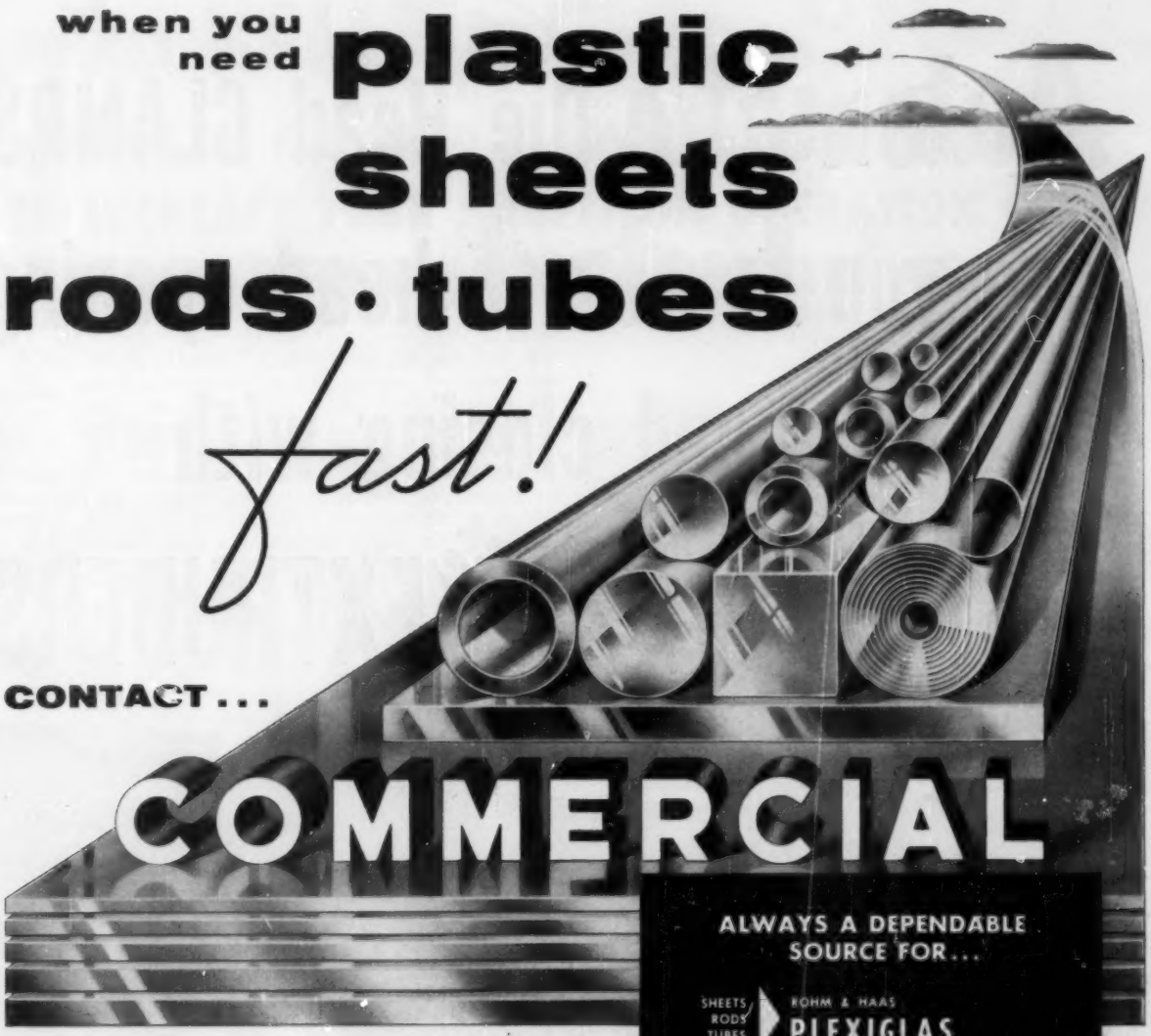
Monsanto and Plax join up to sell Polyflex. Monsanto and Plax Corp. have made a distributorship agreement to develop and expand markets for Plax' Polyflex 100 series oriented polystyrene film and sheeting. Monsanto will add Polyflex to its present line of films and other plastics materials in each of its 13 major marketing areas. The polystyrene film is presently manufactured in thicknesses ranging from 0.001 to 0.020 in. and is used for such items as packages, lids for containers, decorated plates, place mats, and other products.

Increased market for cellulose acetate film. A big push is now under way to move large quantities of acetate film into the fresh fruit and produce market at retail levels. A year of thorough testing through the facilities of two large distributors of packaging materials to food chains has proved that acetate is a superior material for wrapping food and produce by the merchant himself just before he puts it on the shelf. Big advantage of acetate is that it stays crisp and breathes, thus preventing foggy-looking packages.

The film is Celanese' extruded S-652 formulation, #88 gage—slightly less than a mil. It will be furnished in bundles of 1000 units in sizes ranging from 10 by 10 to 20 by 20 inches. It is thus easy to handle and saves clean-up time. It can be sealed easily with plates or hand irons with Teflon-impregnated fibrous glass pads. Sealing temperatures range from 375 to 450° F., but 425° F. is ideal. At 0.0284¢ per 1000 sq. in., it is claimed to be less costly than cellophane for the same type of job.

For additional and more detailed news see Section 2, starting on p. 258.

when you need **plastic sheets rods · tubes** *fast!*



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HERE AT COMMERCIAL . . . This we can assure you . . . Whether you need a short rod of Phenolic Laminate or a truckload of Plexiglas sheets . . . you get the plastic you want . . . *fast* . . . in any desired size, thickness, color and quantity. COMMERCIAL is the industry's largest, most completely dependable source for plastic sheets, rods, tubes and film.

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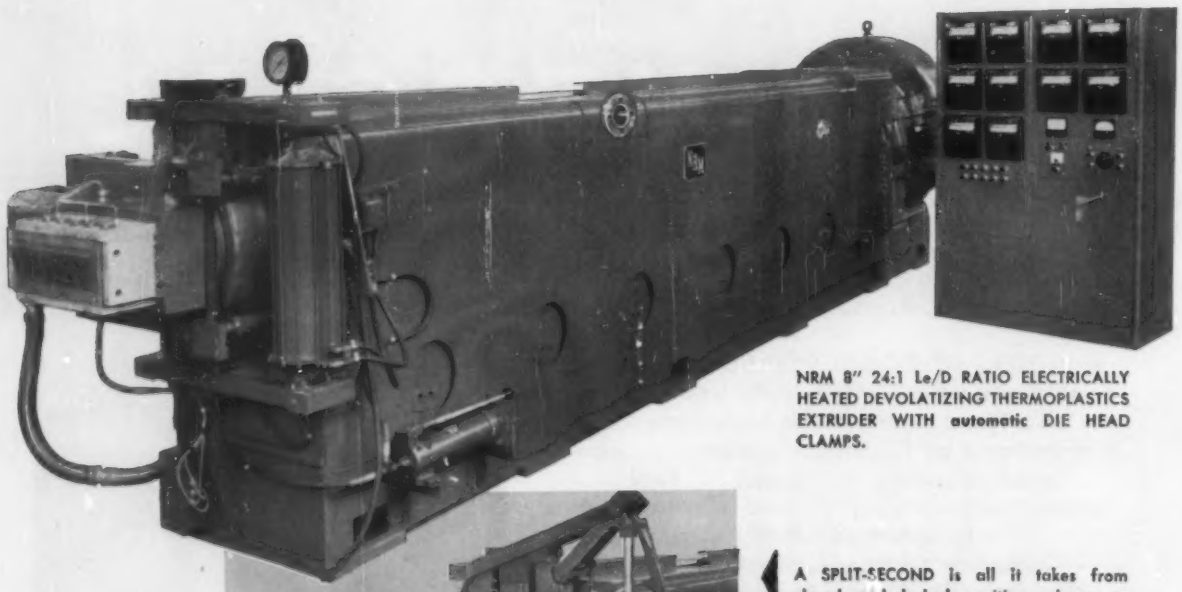
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630 Broadway, N.Y. 12, N.Y.
Phone: GRamercy 7-5000

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3801 N.W. Second Ave., Miami, Fla.
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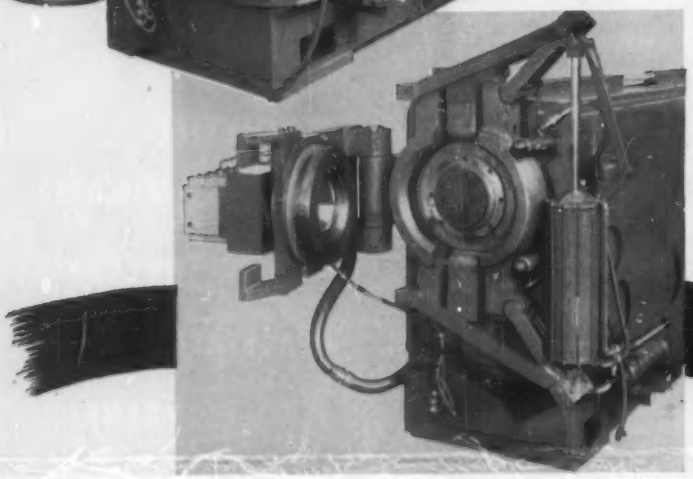
ALWAYS A DEPENDABLE SOURCE FOR . . .

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RODS, TUBES	DU PONT	LUCITE
TAPE, RODS, TUBES, SLABS	DU PONT	TEFLON
RIGID SHEETS	BAKELITE	VINYLITE
SHEETS, RODS, TUBES	ST. REGIS PHENOLIC	LAMINATES
FILM, SHEETS, RODS, TUBES	DU PONT	POLYETHYLENE
SHEETS, FILM	CELANESE	ACETATE
SHEETS, RODS, TUBES, SLUGS	DOW	POLYSTYRENE

Automatic Die Head CLAMPS give you Instant head opening and closing with NRM *thermoplastic* EXTRUDERS



NRM 8" 24:1 Le/D RATIO ELECTRICALLY HEATED DEVOLATIZING THERMOPLASTICS EXTRUDER WITH **automatic** DIE HEAD CLAMPS.



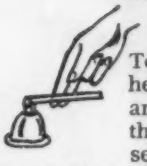
A SPLIT-SECOND is all it takes from closed and locked position, above, to fully open position, below . . .

Here's the Story

2709

Another NRM "first" -

AUTOMATIC DIE HEAD CLAMPS WERE DEVELOPED TO INCREASE YOUR *PROFIT* ON OPERATION OF LARGE, HIGH CAPACITY NRM EXTRUDERS



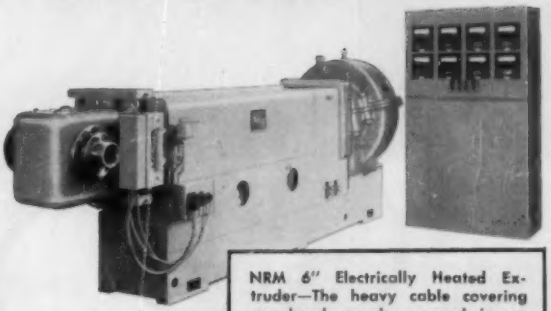
Touch a lever . . . instantly the extruder die head is unlocked to swing open for quick die and screen changing. Swing it shut and touch the lever again . . . instantly the head is securely locked into operating position and production can continue . . . That's NRM's answer to the plastics industry's need for an easier, faster means of opening and closing die heads, when extruder size and operating pressure makes swing-bolt heads less practical.

The automatic die head clamp is not a new idea. It's been in use on large NRM Rubber Extruding Machinery for a good many years. Its engineering has been refined to the ultimate degree . . . its practicability proven beyond question. Now, with the size, capacity and operating pressure of plastics extruders steadily increasing, the feature becomes not only practicable but *desirable* on these, and logically NRM is first to make it available. Besides the faster extruder set up time, the automatic head clamps make possible *other* advantages equally important to you:

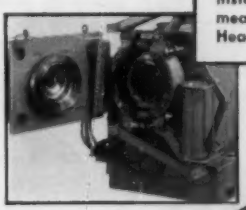
● **POSITIVE SEALING** eliminates any possibility of plastic leaking around the head and wasting material. As the clamp closes, mating surfaces of the head and extruder are "wedged" together and secured by locked toggle mechanism capable of retaining pressures far in excess of those developed by the extruder.

● **FOOLPROOF ACTION** is assured . . . there's no speculation as to the dependability of the head clamp mechanism. It is engineered specially for NRM Plastics Extruders from designs long since perfected for our rubber extruders. It is simple, compact and ruggedly constructed.

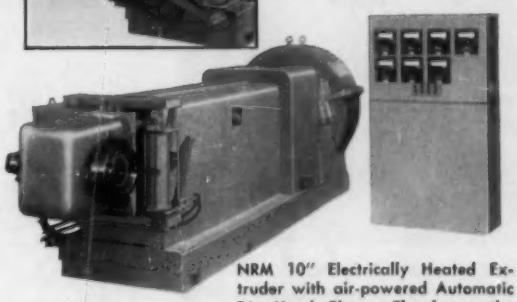
● **PNEUMATIC CYLINDERS** power the automatic die head clamps, unless hydraulic action is preferred, in which case independent hydraulic systems can be provided to actuate the die head clamps.



NRM 6" Electrically Heated Extruder—The heavy cable covering crosshead can be opened in an instant, without manual effort, by means of the new Automatic Die Head Clamp.



This is a typical air-powered Automatic Die Head Clamp.



NRM 10" Electrically Heated Extruder with air-powered Automatic Die Head Clamp. The larger the extruder, the more important the Automatic Clamp becomes.

CONTACT US FOR MORE DETAILS

We'll be happy to discuss the new automatic head clamps further with you, as well as the many *other* advanced design and operating features to be found only on NRM Extruders. Check us on your plastics extrusion machinery requirements today.

2709

NRM

NATIONAL RUBBER MACHINERY CO.

General Offices and Engineering Laboratories: 47 West Exchange St., Akron 8, Ohio. HEmlock 4-1961

EASTERN PLANT: 384 Getty Ave., Clifton, N. J. PIascott 7-4600

SOUTH: The Robertson Company, Rutland Building, Decatur, Ga. CRescent 1681

WEST: S. M. Kipp, Box 447, Pasadena 18, Cal. SYcamore 6-2110

MID-WEST: National Rubber Machinery Co., 5875 N. Lincoln Ave., Chicago 5, Ill.

CANADIAN: F. F. Barber Machinery, Ltd., 107 Fleet St. West, Toronto, Ont. EMpire 2-9291

EXPORT: Chanl Products Corporation, 360 Fourth Ave., New York, N. Y. MUrray Hill 5-1320



"I see a successful business venture"

Oddly enough, Madame Zanora is right—for once. She's predicting the gentleman's future just after he gave an involved molding job to Boonton.

Here at the plant we don't have a crystal ball. In fact, we don't need one. Our know-how—the savvy we've acquired in thirty-five (35) years of turning out injection and compression moldings of just about every type and description—enables us to call the turn on the customer's job. We're old hands at taking over the worrisome problems involved in producing the piece, and we keep the customer informed all along the way. That's why we don't need clairvoyance to predict satisfactory results.

Why not let us determine *your* future at least as far as moldings are concerned. We'll not only predict a successful outcome, but we'll back up our forecasts with superior workmanship. Call for a preliminary seance today.

BOONTON MOLDING CO.

BOONTON, NEW JERSEY

NEW YORK OFFICE—CHANIN BUILDING, 122 EAST 42nd STREET, OXFORD 7-0155

CONNECTICUT OFFICE—P. O. BOX 486, TUCKAHOE 7, N. Y., WOODBINE 1-2109

Now You Can Actually BOIL Polyethylene Film!



Even boiling water can't hurt film made of new "Poly-Eth Hi-D" developed by Spencer Chemical Company.

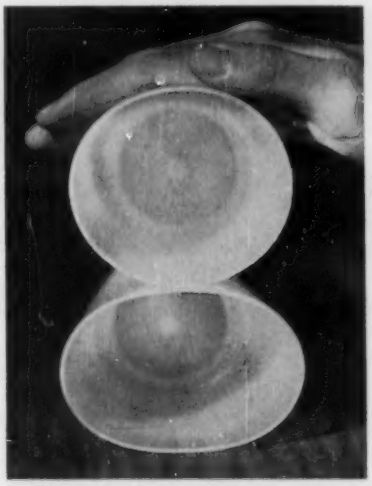
Remarkable new Hi-Density "Poly-Eth" by Spencer resists heat up to 240° F. It has the clarity and gloss of high pressure polyethylene, while approaching the rigidity of low pressure polyethylene

Food cooked in "see-through" packages is one of the countless new uses for polyethylene now possible because of Spencer Chemical Company's new high density polyethylene resin. Developed by Spencer's own staff, this new resin, trademarked "Poly-Eth Hi-D," has a density ranging from .935 to .940. It is non-toxic and odorless. Spencer is the first domestic producer to offer resins in this high density in commercial quantities.

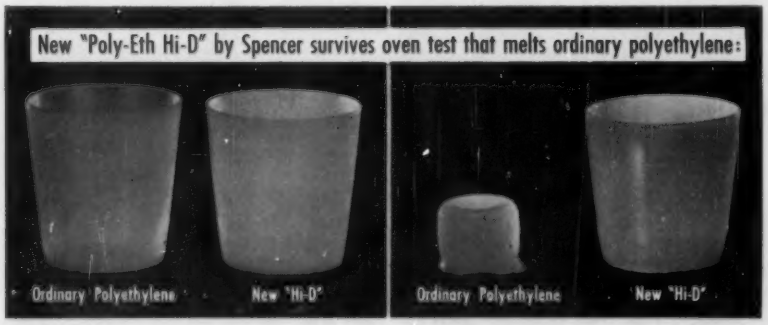
Among the unique properties of this new "Poly-Eth Hi-D" compared with standard or intermediate density polyethylene, here are a few of the most important: (1) Higher heat resistance —easily withstands boiling water without deformation; (2) Improved tensile strength and rigidity — permits in some cases, a money-saving reduction in wall thickness without loss in strength; (3) Less permeable.

Faster cycling periods are usually possible with "Poly-Eth Hi-D," since these resins can be taken from the mold at higher temperature. And products molded from "Poly-Eth Hi-D" will have improved resistance to surface abrasion.

Only Spencer offers you commercial quantities of this new polyethylene. So, for more information, contact your nearest Spencer sales representative, or write Spencer Chemical Company for a "Poly-Eth Hi-D" data sheet.

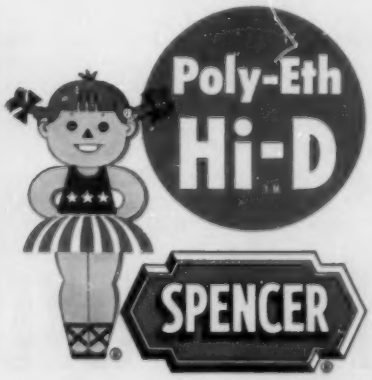


New "Poly-Eth Hi-D" (top) is stiffer than ordinary high pressure polyethylene (bottom cup). And notched Izod tests show it is tougher (resists impact better) than conventional low-pressure polyethylene.



(1) Before going into oven, these two polyethylene cups looked alike. Cup at left is made from standard polyethylene. Cup at right is Spencer Chemical Company's new high density polyethylene "Poly-Eth Hi-D."

(2) After 30 minutes at 240° F, the ordinary polyethylene cup has melted down; the "Hi-D" cup has retained its shape. This means you can use "Hi-D" for products subject to temperature of boiling water and higher.



SPENCER CHEMICAL COMPANY
Dwight Bldg., Kansas City 5, Mo.

Now—At Last . . .

MASSIVE NYLON MOLDINGS

Now with New Spencer Nylon you can injection-mold big void-free pieces that are

- **LIGHTWEIGHT**
- **DURABLE AS METAL**
- **CORROSION RESISTANT**



Giant vs. Dwarfs! Photo shows nylon moldings of conventional size, compared to the huge sizes now possible with new Spencer Nylon. Combining metal-durability with plastic-lightness, these big new injection-moldings can be price-competitive with metal.

A new kind of nylon now makes it possible to produce injection-molded pieces weighing pounds instead of ounces. This means you can make nylon pieces with larger surface areas and thicker cross-sections than ever before possible. This development is of major significance to the plastics industry, for it brings into range such multi-million-pound targets as cases for portable radios, motor boat propellers, conveyor belt links, electric motor housings, and other large items made of metal.

Such massive moldings have long been needed, for nylon combines the durability of metal with the feather-lightness of plastics. In properly designed applications where friction is involved, nylon works better than metal, for it is self-lubricating and abrasion-resistant.

Nylon often offers real economy in the cost of finished pieces. As compared with metal, its low specific gravity permits the production of more parts per pound. Manufacturing cost is cut by molding to close tolerances, rather than machine finishing. Thus, despite nylon's relatively high cost per pound, it is frequently possible to produce nylon parts at a substantially lower cost than metal.

But until recently, it has been impossible to supply these profitable big-piece moldings. At molding temperature ordinary nylon is highly fluid, making it difficult to handle. And because it solidifies so quickly, large void-free moldings have been hard to produce.

New Spencer Nylon corrects these faults. Because it has a working range of nearly 100° F., it's easier and safer to handle, and less likely to degrade during molding. Because it has a greater plasticizing range, it sets up more slowly and, to a high degree, prevents voids.

Besides being light and strong, the resulting moldings—unlike metal—are non-corrosive. Contrasted with polyethylene, nylon is unaffected by hydrocarbons, and can be used for applications involving gasoline, oils, fats and turpentine. Its excellent heat resistance permits nylon to be used where steam sterilization is required. And Spencer Nylon offers the most highly controlled specifications of any nylon available today, because it is manufactured by continuous polymerization instead of by the old-fashioned "batch" process.

A multi-million pound plant, now under construction in Henderson, Kentucky, will soon be ready to supply you with Spencer Nylon. To meet existing demands, Spencer is ready NOW to bring you AKU-manufactured shipments of this same superior nylon in eight grades. Write to Spencer Nylon, Spencer Chemical Co., Dwight Building, Kansas City 5, Missouri.

NOW! NYLON *by* SPENCER

SPENCER

SPENCER CHEMICAL COMPANY

GENERAL OFFICES: DWIGHT BUILDING, KANSAS CITY 5, MISSOURI



Baby Playthings



Toddler Toys



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Containers & Packaging

Symbols of your potential through Tupper Corporation



Premiums



Do-It-Yourself Materials

● Whatever your custom needs in plastics manufacturing, call on Tupper's wide experience and modern manufacturing facilities. Our large, up-to-date plants, equipped with the best production machinery, are available for materials, injection molding, extruding, vacuum forming, blow molding—and other advanced processes.

The Tupper Engineering Department has developed the greatest number of patents in the industry for polyethylene seals, closures, and dispensers—and other items in other plastics. This know-how can be tapped by you to place your plastic products in a position of leadership.

Tupper seals and other Tupper products are protected against unauthorized manufacture by about 150 U. S. and foreign patents and patents applied for, plus numerous trademarks and copyrights.

TUPPER! Trade-mark

TUPPER CORPORATION

Manufacturers of: CONSUMER, INDUSTRIAL, PACKAGING and SCIENTIFIC PRODUCTS

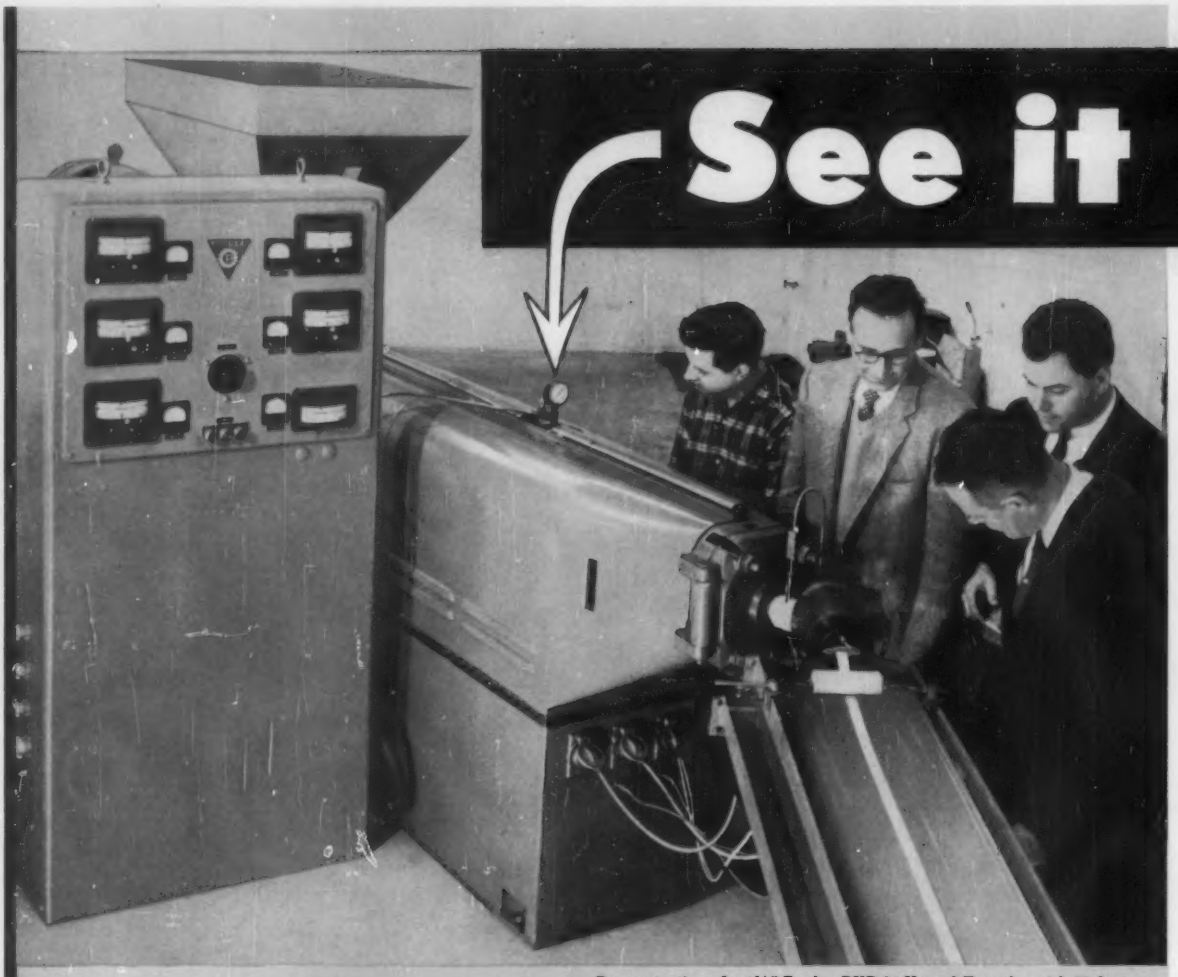
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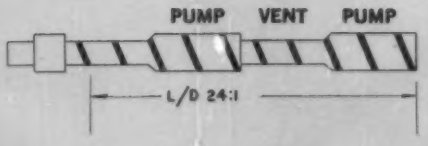
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225 Fifth Ave., N.Y.C.



Demonstration of a 4½" Prodex PVP 24 Vented Extruder with 30 degree Prodex cross head. See this machine demonstrated on your own material.

The Prodex PVP 24 Extruder

The unique Prodex PVP 24 Extruder plasticizes the compound to a uniform melt viscosity. The material is then positively pumped into a devolatizing section where moisture, monomers, etc., are removed. A second pump positively meters the compound into the die.



Arrange for a Demonstration Today

Prove to yourself the outstanding performance of Prodex PVP 24 Vented Extruders on your own material. Call or write today. No obligation, of course.

Yourself!

A demonstration proves the superior performance of the Prodex PVP 24 Vented Extruder

1. Eliminates Porosity

All porosity due to moisture, air, monomer or other volatile matter is completely eliminated.

2. Increases Output

Separation of plasticizing and pumping functions permits optimum design of both.

3. Improves Dispersion

Double metering pumps subject material to more intensive mixing. Venting section provides mass intermixing.

4. Eliminates Pre-Drying

All materials are fed directly to the extruder. Start up without delay. Reduce contamination.

5. Reduces Heat Degradation

Material is brought up to extrusion temperature rapidly by frictioning. Moved through venting section without further shearing. Passes through extruder rapidly.

6. Improves Precision

Front metering pump which supplies die is provided with a uniform melt viscosity feed. No overriding forward pressure is exerted on front pump.

Typical Production Rates on Prodex PVP 24 Extruders

Extruder Size	Drive H.P.	Cross Section	POUNDS PER HOUR		
			PVC Dryblend	Polyethylene Pipe Cpd.	Polystyrene High Impact
2½"	20	.11 sq. in.	180-240	150-180	150-240
4½"	60	.25 sq. in.	550-660	450-520	500-630
8"	200	1.00 sq. in.	1700-2100	1450-1600	1500-1900

No porosity was present in any of the above extrusions. All compounds contained at least 1% moisture and were not extrudable on ordinary machines without porosity. All rates at precision tolerances

Prodex PVP 24 Extruders are available in the following sizes: 1¾", 2½", 3½", 4½", 6", 8".

For further details write for bulletin E-4 today.

PRODEX

PRODEX EXTRUDERS

PRODEX CORPORATION, FORDS, N. J., PHONE: HILLCREST 2-2800

MANUFACTURERS OF PROCESS AND EXTRUSION MACHINERY



Thin wall clear polystyrene containers are formed in this mold of CRUCIBLE CSM 2. Mold Builder: Standard Tool Company, Leominster, Mass.

they picked ultrasonically inspected

CRUCIBLE CSM 2

from warehouse stocks

FOR HIGHER FINISH . . . LONGER MOLD LIFE – It takes a highly polished and dimensionally accurate mold to form clear styrene into these thin walled containers. And, because production-runs go into the millions, the mold steel has to be long lasting. Both are good reasons why CRUCIBLE CSM 2 was selected.

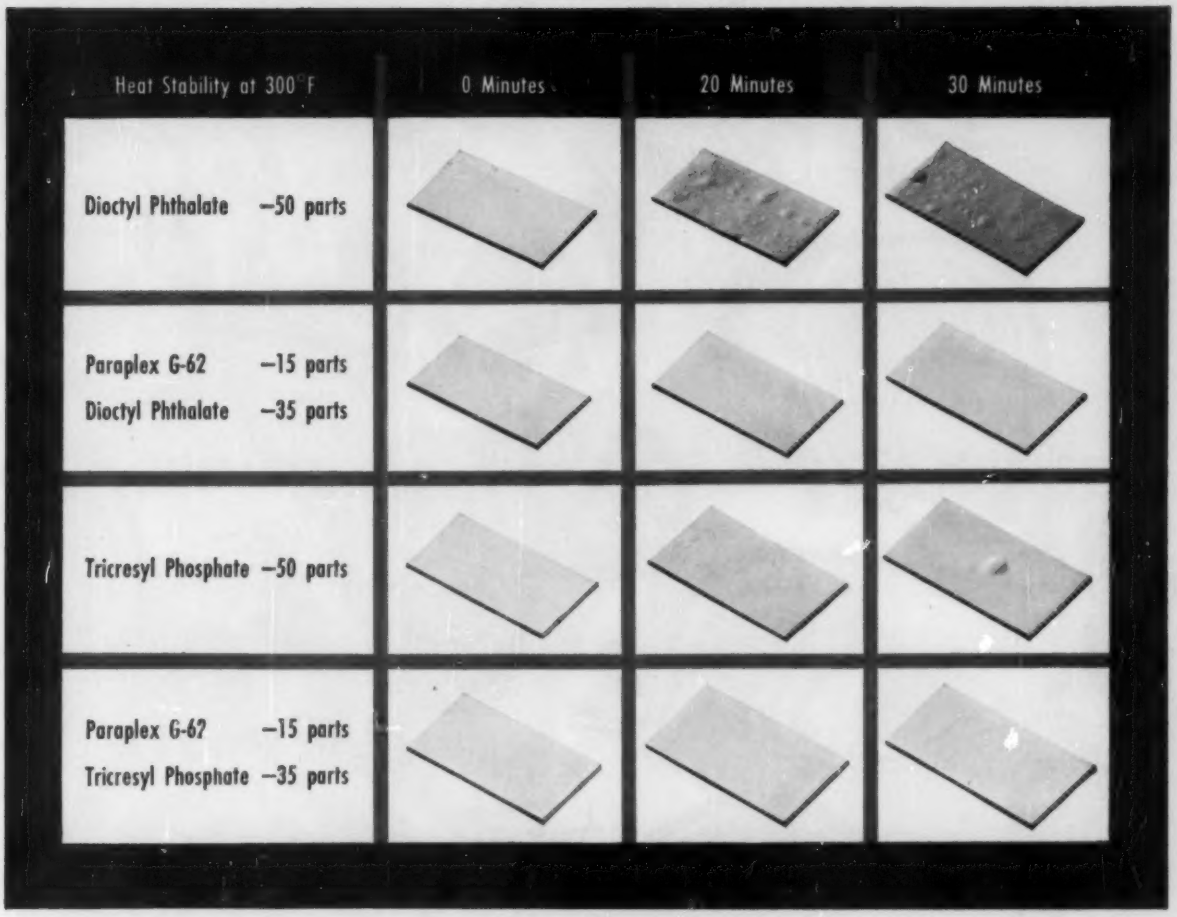
For CRUCIBLE CSM 2 is an exceptionally *clean* steel—uniform in composition and structure—with superior machining and polishing characteristics. And for absolute dependability, *every piece* of CSM 2 is ultrasonically inspected.

What's more, for your convenience, CSM 2 is immediately available from Crucible *warehouse stock* in 205 sizes. Next time you need mold steel—call Crucible. *Crucible Steel Company of America, The Oliver Building, Mellon Square, Pittsburgh 22, Pa.*

CRUCIBLE first name in special purpose steels

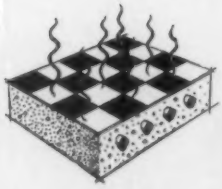
Crucible Steel Company of America

Canadian Distributor—Railway & Power Engineering Corp., Ltd.



PARAPLEX G-62

helps you get color uniformity in vinyl tiles



PARAPLEX G-62 simplifies the manufacture of vinyl floor tile . . . gives added life to tile in use.

The samples of vinyl floor tile above illustrate the superiority of PARAPLEX G-62 over conventional plasticizers in providing heat stability to vinyl compounds. This stability lets you mill vinyl compounds at high temperatures . . . helps keep them from deterioration and discoloration. The result? Shorter processing cycles, increased production.

In use, vinyl compounds such as tile also benefit from PARAPLEX G-62. Because the plasticizer is relatively non-volatile, loss from tile laid over radiant heating, for example, is held to a minimum. In addition to all this, PARAPLEX G-62 resists attack by ultraviolet light and extraction by soap, detergent, fat, grease, and oil.

For more information on all of the plasticizers produced by Rohm & Haas Company, ask for *What You Should Know About* PARAPLEX *and* MONOPLEX *Plasticizers.*

PARAPLEX *and* MONOPLEX *are trademarks, Reg. U. S. Pat. Off. and in principal foreign countries.*

Chemicals for Industry

ROHM & HAAS COMPANY

THE RESINOUS PRODUCTS DIVISION

Washington Square, Philadelphia 5, Pa.

Representatives in principal foreign countries



in greater St. Petersburg

where work and play are combined—



PROFITABLY! Join these major business firms who have come to this area in the past two years. Excellent opportunities await manufacturers of extruded and molded plastics who would serve existing and incoming industries. Substantial source of manpower, excellent schools, fine transportation, favorable tax structure, make this an ideal community for *your* employees to live, work and play where most people dream of retiring. Write today for detailed literature.

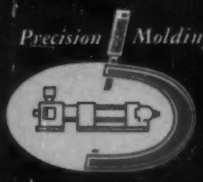
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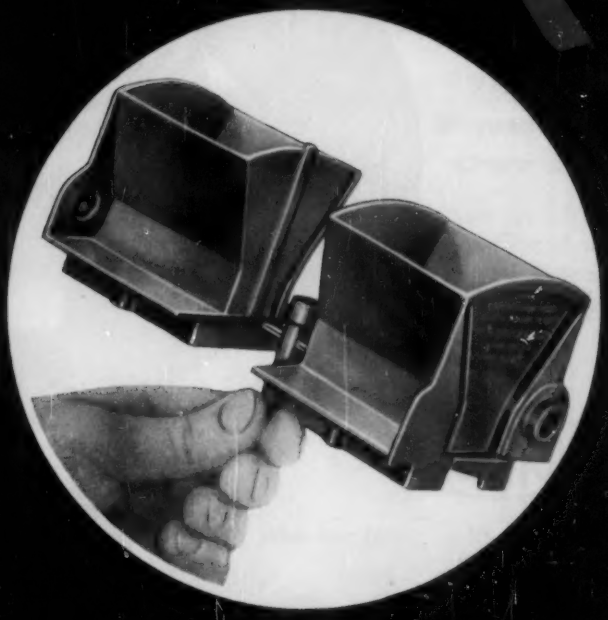
Jack Bryan, Industrial Director **Dept. G** **St. Petersburg, Florida**

give your plastic products the benefit of the

MAKRAY ok

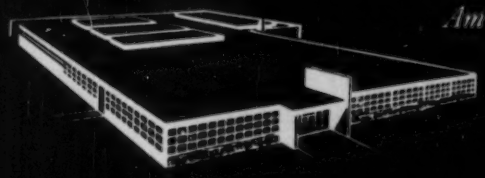
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The Makray "OK" on your product is the result of a unique system of engineering, designing, molding and assembly room techniques that result in the best in plastics technology. But, while we are unique in the quality of painstaking craftsmanship and inspection that we apply to your products, we are completely competitive in price. Whether we originate the design or work from yours our objective is the same: To give you a plastic product that looks better, works better and sells better.

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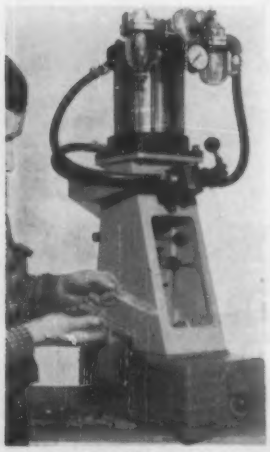
MINI-JECTOR

TRADE MARK

PLASTIC INJECTION MOLDING MACHINES

THERE IS A MINI-JECTOR MADE TO SOLVE YOUR SMALL CAPACITY (⅓ oz. to 1 oz.) INJECTION MOLDING PROBLEMS

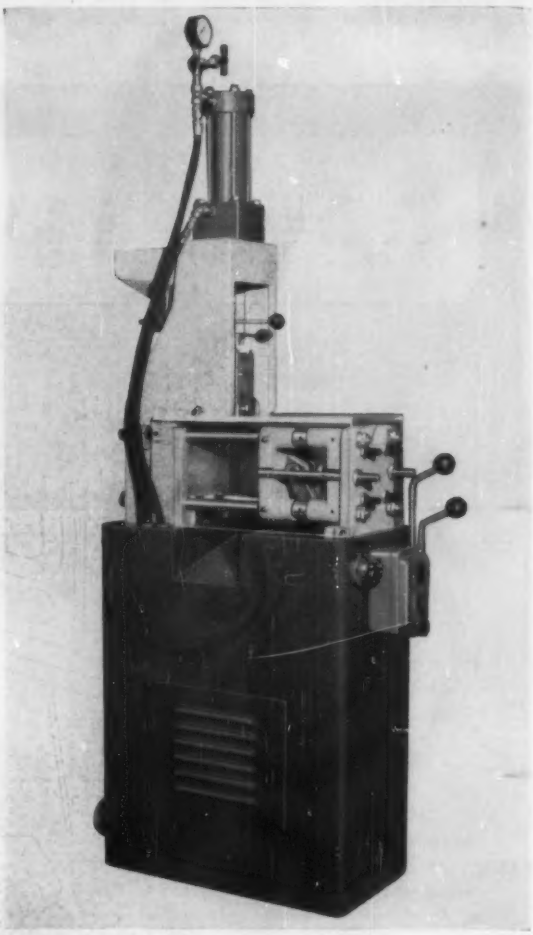
Here are the small thermoplastic injection molding machines that do a small job in a big way! Economical to operate and low in cost, these up to 1 ounce plastic injection molding machines are turning out thousands of small plastic items every day for hundreds of satisfied users. Molds any thermoplastic . . . including Nylon. The Mini-Jectors are the most versatile machines in their class. Simple and compact in design, Mini-Jectors operate easily and efficiently and owners everywhere find they pay for themselves many times over.



MODEL 45 "WASP" ¾ oz. capacity air-operated Mini-Jector . . . fast and economical. 6" air cylinder operates ram . . . 40 to 150 pounds of air pressure required depending on type of plastic used and product being molded. Material hopper capacity 4 pounds.



MODEL 50 "WASP" a new Mini Jector . . . capacity 1/3 oz. to 1 OUNCE at pressures up to 30,000 PSI. This is an ideal model for precision insert work with any type of plastic. Hydraulically operated.



MODEL 60-PC 75 "HORNET" POWER OPERATED LEVER CONTROLLED. Mold size 6" x 5" x 5⅛"

This model retains all of the time-tested features of our popular 60-HC75 with the added feature of hydraulically operated, lever controlled mold opening and closing for faster, easier production. Like all Mini-Jectors the 60-PC75 gives you the most economical way of injection molding articles in the capacity range of ⅓ oz. to 1 oz., where modest scale production is required.

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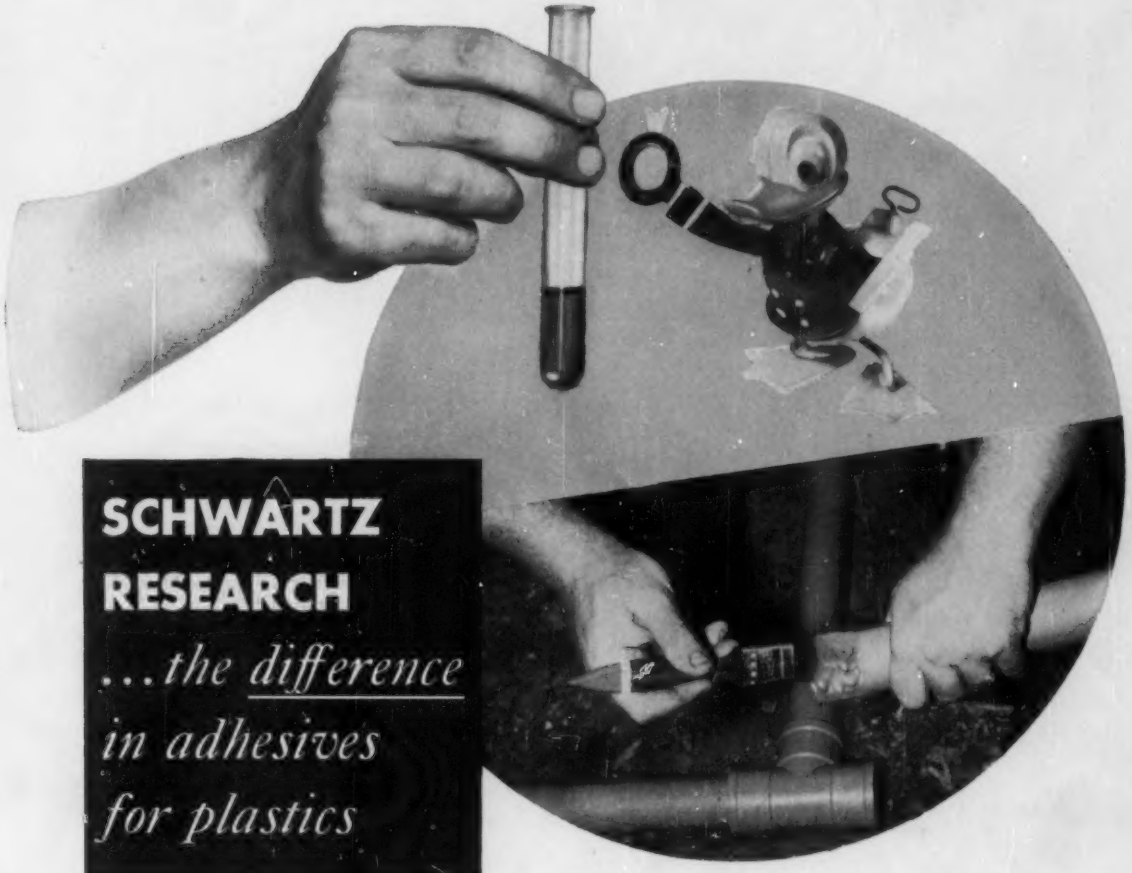


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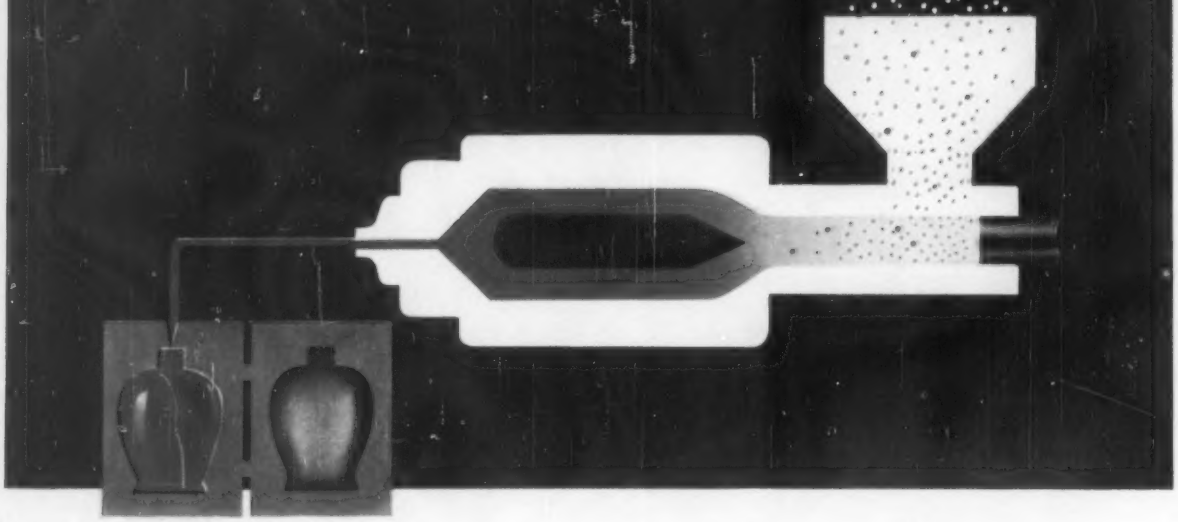
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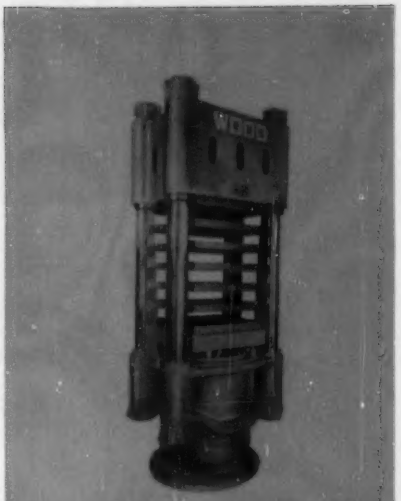
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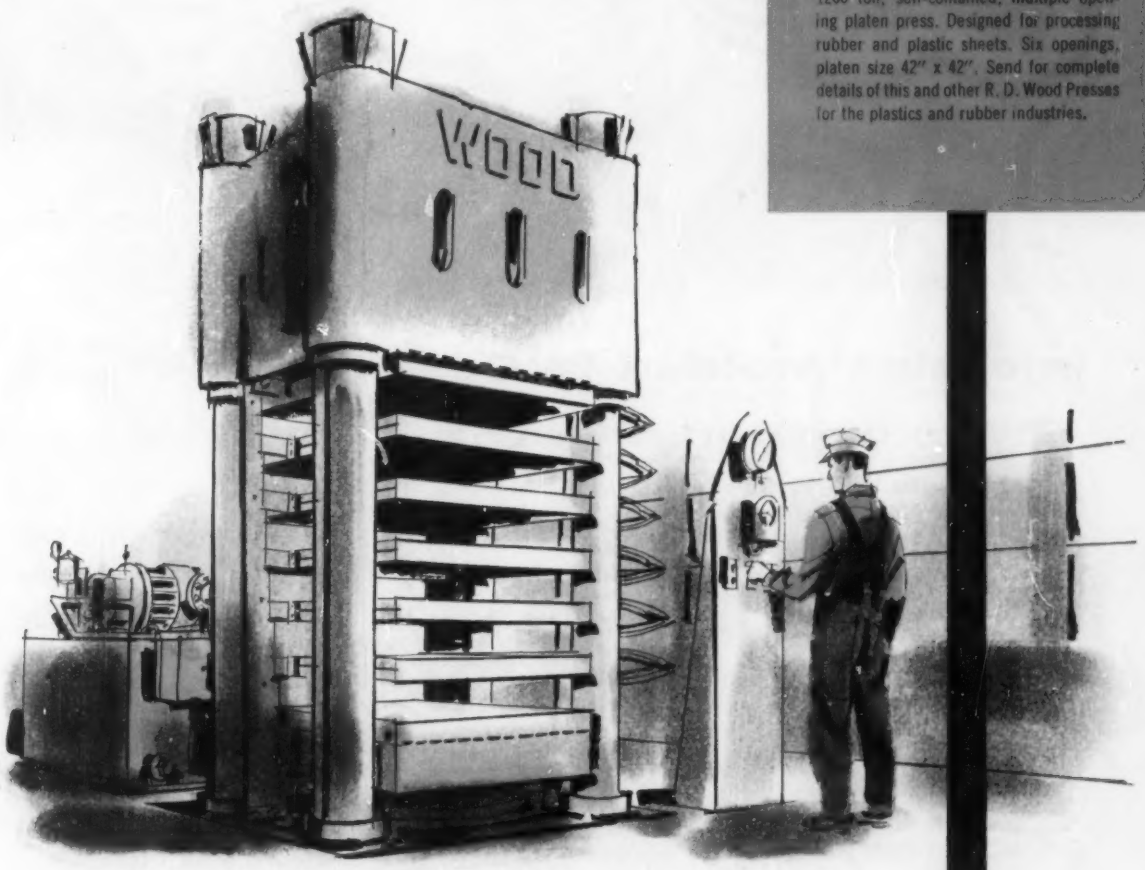
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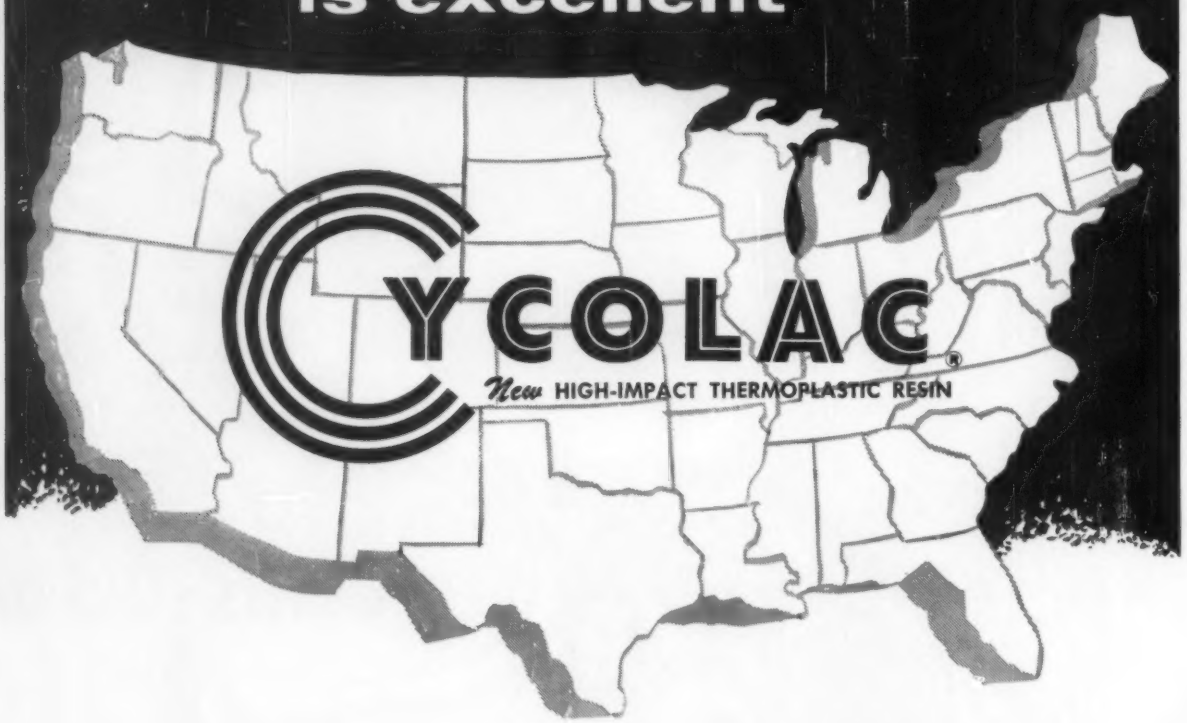
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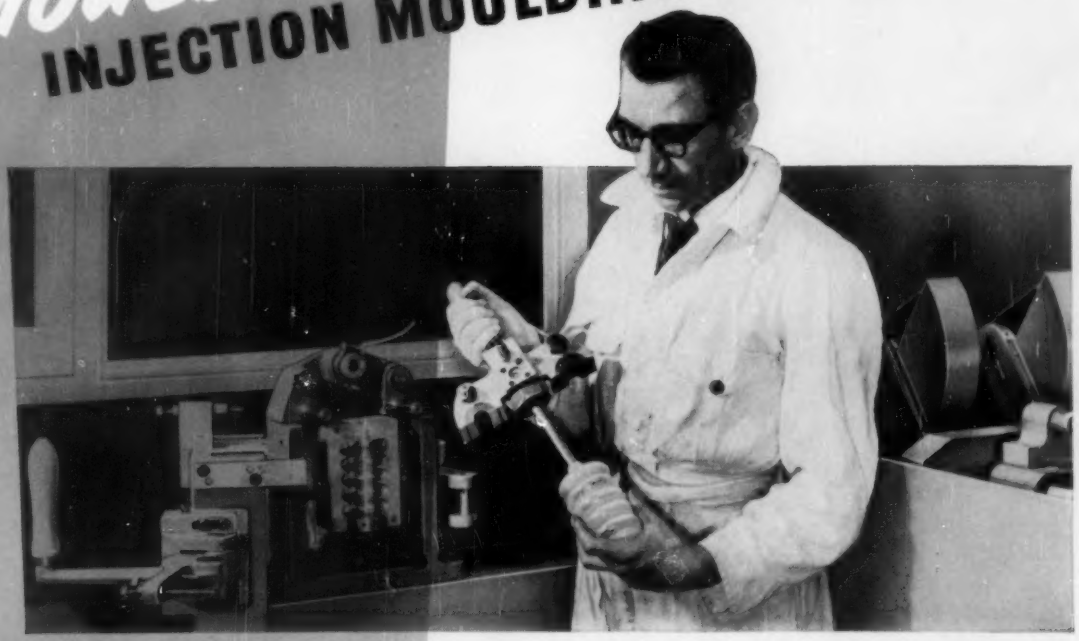
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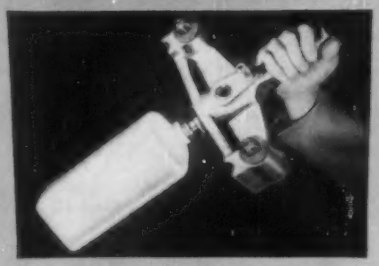
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MARBON CHEMICAL . . . ***Precision Resins for Precision Made Products***

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Increase the scope and profit making potential of your moulding equipment with a Granbull Blow Moulding Unit. It is used in conjunction with any standard moulding machine, converting it for blow moulding at a fraction of the cost required for special purpose machinery. Write for full details of the Standard and Major Units, stating your specific requirements and giving the type and capacity of your moulding machines.



Standard Twin Impression Unit

★ ADAPTABLE TO ANY STANDARD INJECTION MOULDING MACHINE

★ SUITABLE FOR LONG OR SHORT RUNS

★ SINGLE TWIN OR MULTI-IMPRESSION

★ ELIMINATES HEAVY COST OF SPECIAL PURPOSE MACHINERY

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Highly Loaded Asbestos Floor Tile

Special Low Mol. Wt. Vinyl Copolymer Resin	100 parts	Calcium Carbonate	250 parts
Phthalate Type Plasticizer	20 parts	Titanox RA-50®	10 parts
Adipate Type Plasticizer	5 parts	"Dutch Boy" NORMASAL®	6 parts
Chlorinated Hydrocarbon	10 parts	"Dutch Boy" TRIBASE	2 parts
Asbestos	100 parts	"Dutch Boy" LEADSTAR	1 part

This is a tough, hard, long-wearing stock with excellent dimensional stability. In it, the action of "Dutch Boy" Normasal is specific and unique . . . to prevent color changes from iron or other impurities present in the asbestos. "Dutch Boy" Tribase handles the high fluxing heat. Leadstar aids lubricity.

For heavy-duty tiles... use this highly-loaded "Dutch Boy" Stabilized vinyl stock*



Moderately Loaded Asbestos Floor Tile

Vinyl Copolymer Resin	100 parts	Titanox RA-50	25 parts
Dioctyl Phthalate	60 parts	"Dutch Boy" NORMASAL	7 parts
Epoxy Plasticizer	10 parts	"Dutch Boy" CLARITE A	2 parts
Asbestos	140 parts	"Dutch Boy" CALSTAR	0.50-0.75 parts
Calcium Carbonate	130 parts		

A high gloss, resilient stock suitable for vivid coloring. As in the heavy-duty stock, Normasal prevents reactive color changes. "Dutch Boy" Clarite A teams up with "Dutch Boy" Calstar to provide heat and light stability plus lubricity.

For beauty-duty tiles... use this moderately-loaded "Dutch Boy" Stabilized vinyl stock*



Asbestos-free Floor or Wall Tile

Vinyl Copolymer Resin	100 parts	"Dutch Boy" CLARITE A	2 parts
Dioctyl Phthalate	35 parts	"Dutch Boy" CALSTAR	0.50-0.75 parts
Epoxy Plasticizer	5 parts		
Filler	200 parts		

This is a standard, asbestos-free stock with excellent flexibility suitable for walls and other light wear applications. "Dutch Boy" Clarite A and Calstar again team up to give this stock smooth processing characteristics and permit vivid coloring.

*Modify as called for by pigmenting requirements.

For light-duty tiles... use this asbestos-free "Dutch-Boy" Stabilized vinyl stock*

Outpace the flooring market on *color* with these 3 "Dutch Boy" Stabilized stocks

... one to build up and preserve color in each standard type of tile or cove molding

"Dutch Boy" Stabilizers do three things for color in highly filled vinyl flooring stocks.

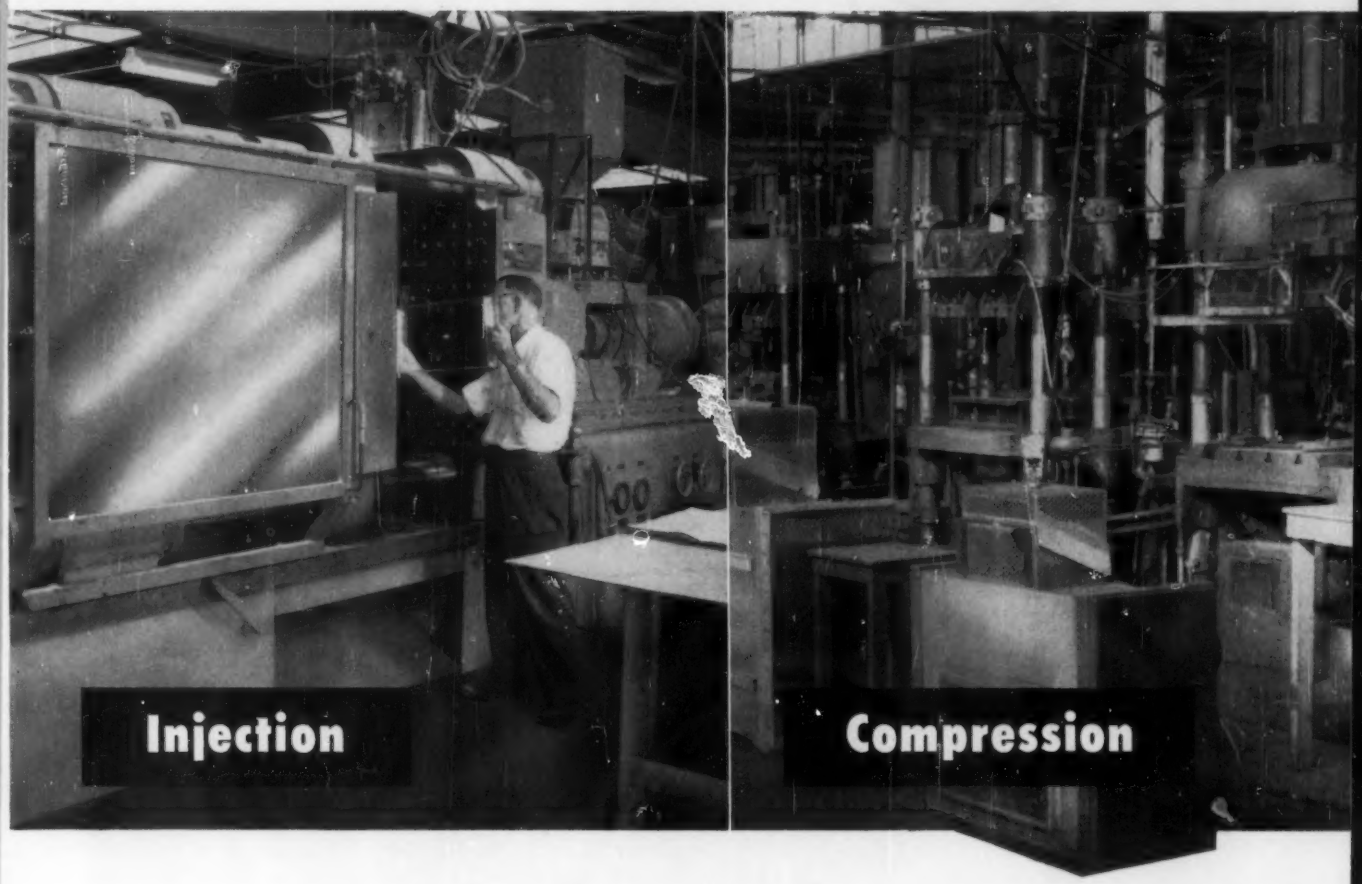
First, they prevent color shifts caused by high processing heat. Second, they prevent changes in hue caused by sunlight and colorant reactivity with resin degradation products. Third, they broaden the range of color choice.

The formulations illustrated show how "Dutch Boy" Stabilizers combine to improve color in typical flooring stocks. For additional information, write National Lead's Technical staff.

Dutch Boy® CHEMICALS

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630 Dorchester Street, West, Montreal

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Injection
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Products molded by the Bridgeport Molded Products Company team are consistent with highest quality standards, representing the combined skills of experience-equipped engineers, utilizing the latest design techniques and modern plant equipment. This is your assurance of maximum production economy and efficiency throughout the entire manufacturing cycle!

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Gering custom compounds *all* thermoplastics for extrusion and injection molding . . . special or standard formulations, varied colors and special effects. All developed to your needs by Gering technicians . . . delivered to your shop ready to mold!

Why not get all the facts on Gering custom compounding service in time to start boosting profits on your next quality molding job! Write today for full information.

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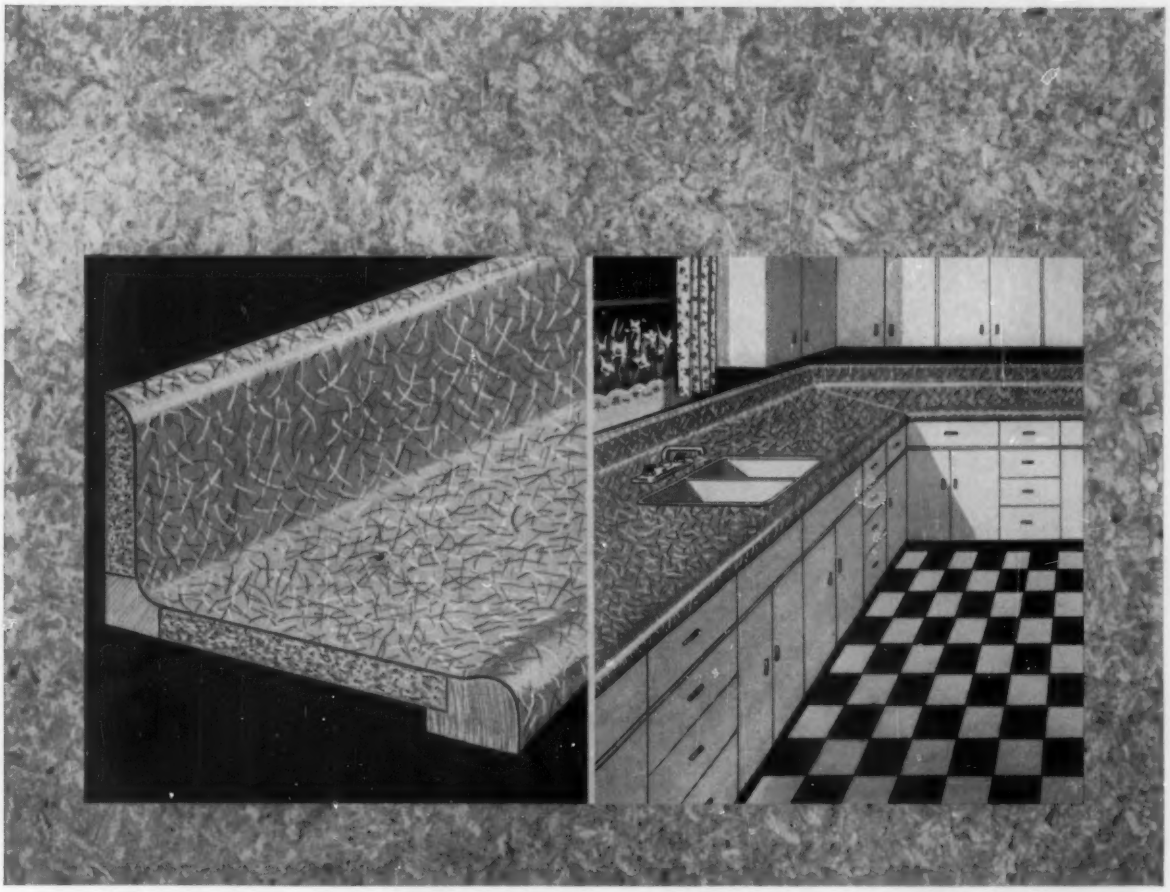
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The desirable characteristics of 4-Square Particle Board make it an ideal basic material for sink, counter and bar tops; for sliding and cabinet doors; for tops, end panels and fronts in furniture and case goods; for any product requiring a finished surface on a smooth, stable base. Due to the uniformity of density and texture, board when laminated can be machined with clean, sharp results.

Thicknesses from 3/8" to 1". Densities from 30 to 60 lbs. Panels less than 4' x 8' can be cut to size for your specifications.

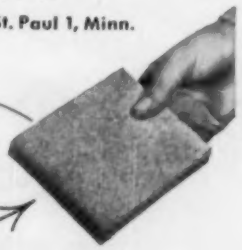
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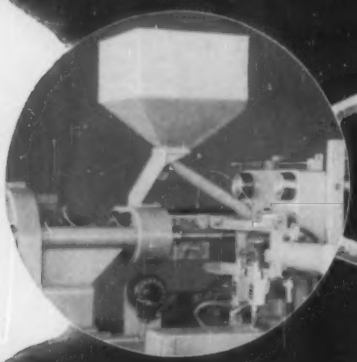
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See it . . . test it. You'll quickly realize the possibilities of important savings and a better product.

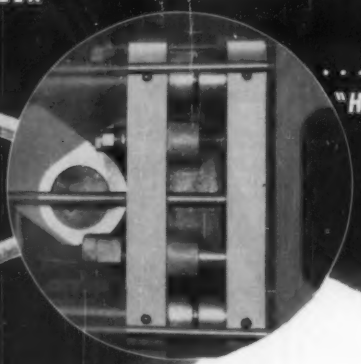


Only the LEWIS "6P" INCLUDES AS STANDARD . . .



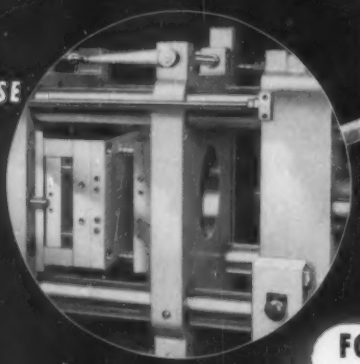


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. . . 200-TON "HYDRA-LOCK" CLAMP

. . . QUICK-RELEASE DIE-LOCK DEVICE



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Machine Division

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The LEWIS pre-plasticizer scores two "firsts". (1) It was developed especially for an 8-ounce machine. (2) It is furnished as *standard equipment.*

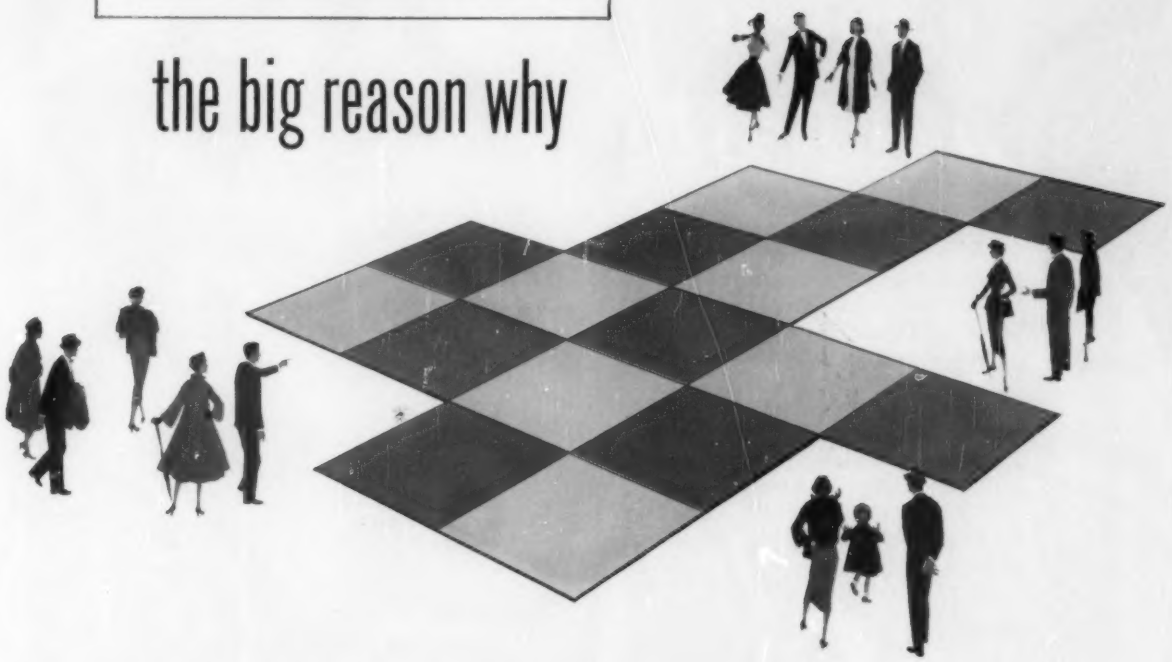
A new concept in pre-plasticizer design, this unit gives molders unprecedented capacities and flexibility of operation. Because of its extremely precise temperature control, it permits intermittent operation without flashing or burning . . . can operate at greatly decreased injection pressures and temperatures. In fact, MODEL "6P" is the first machine capable of molding the new low-pressure linear-type polyethylenes as well as other materials.

The LEWIS "6P" is more than an "improved" model . . . *it is the most versatile production machine ever offered at competitive prices in the 8-ounce class.*

7150-LWM

PERMANENCE...

the big reason why



PLASTOLEIN® 9720 Polymeric

is preferred for vinyl floor tile

It will pay you to investigate Plastolein 9720 Polymeric because it provides the extreme permanence and durability so vital to the life of your vinyl flooring. This results primarily from 9720's outstanding performance relating to such factors as dimensional stability, heat and light stability, volatility, and extraction.

Plastolein 9720 also offers these cost reducing advantages: low plasticizer cost, relatively high efficiency, low filler absorption, and the efficiencies of easy processing. Also, though 9720 is a polymeric, its relatively low viscosity permits the economies of bulk shipping and handling.

With all these advantages, why not try Plastolein 9720 in your vinyl tile formulations—or in any formulation where permanence is essential.

For complete details on 9720 or any of the Plastolein Plasticizers, mail coupon below:

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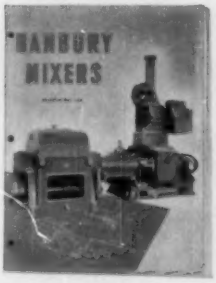
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PLUG VALVE *of Geon for handling corrosive fluids demonstrates molding of complicated shapes with integral threads. At the bearing surfaces Geon is molded to another plastic.*

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All parts shown made by Tube Turns Plastics, Inc.

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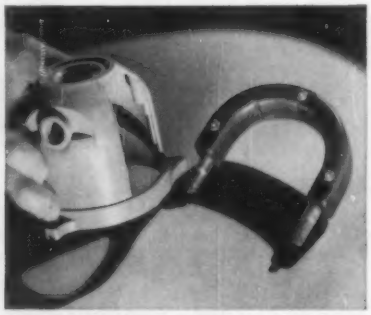
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BIG FELLOWS *include piping tee and motor housing, requiring heavy cross section, chemical inertness, dimensional stability. By contrast, molding for automobile dashboard has thin section, large projected area.*



ELECTRICAL PARTS *include fractional horsepower motor housing which reduces appliance weight, and hanger band for transformer with Geon molded around metal bolt. Geon has excellent dielectric properties.*



AUTO HORN *trumpet shows complicated contours possible in rigid Geon. Note very thin walls obtained in this high-impact material. Photos courtesy Tube Turns Plastics, Inc., Louisville, Ky.*

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MODERN PLASTICS
Volume 34
January
1957
Number 5

Close to 4 billion pounds!

Production of synthetic resins and cellulosics in 1956 just missed arriving at 4 billion lb. according to estimates made in November. If production for November and December turns out to be better than for the same months in 1955, the total figure may go over 4 billion, but it must be remembered that November and December 1955 were unusually high months. If present estimates prove correct, the 1956 production volume will be comfortably over 3.9 billion lb., compared with a volume of 3.85 billion in 1955. If polyethylene production turns out to be more than the estimated 550 million lb. and the alkyds perk up, the 4-billion mark may be surpassed.

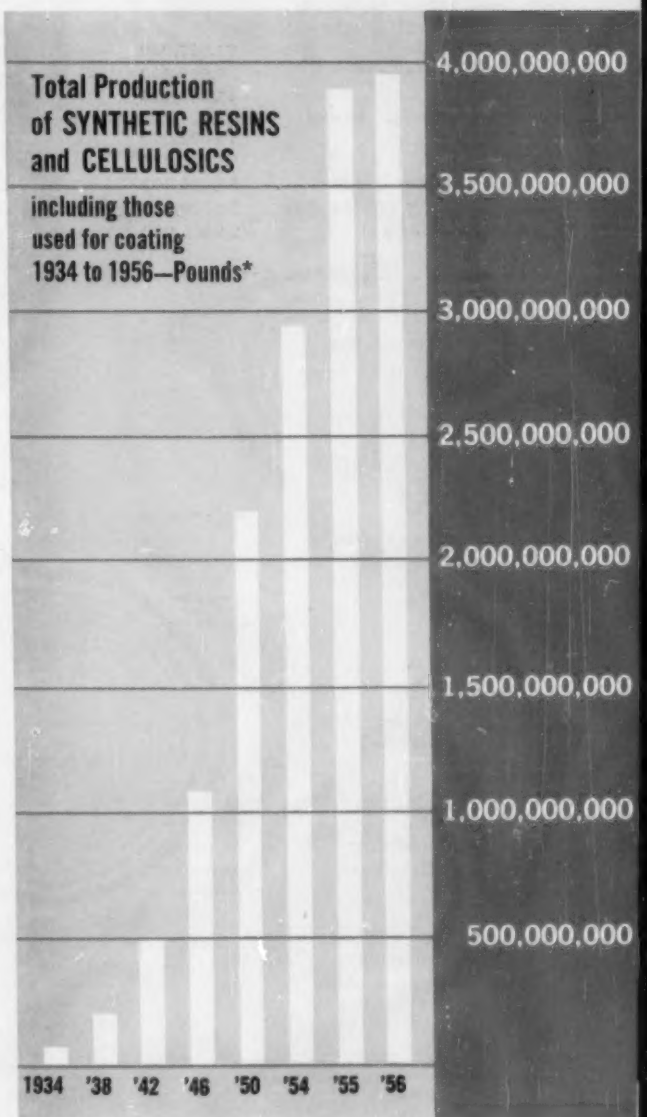
Sales or consumption of cellulosics and synthetic resins in 1956 are estimated at approximately 3.7 billion lb. in 1956 compared to 3.6 billion in 1955.

Total sales volume as used by MODERN PLASTICS Magazine is practically the same as consumption since material that is used by the producer is considered as a "sale" in Table I on the following page. The alkyds and phenolic laminates are the principal resins in that classification.

Total of resins for plastics

The synthetic resins and cellulosics sold or used for plastics totaled a little over an estimated 2.9 billion lb. of material in 1956 compared to a little less than 2.7 billion lb. in 1955. The alkyd resins used in surface coatings, coumarone indene, and petroleum resins make up the balance of the volume and are not generally considered a part of the plastics industry. Alkyd resins were down about 12% in the first six months of the year and coumarone indene was off somewhat from its 1955 peak.

Vinyl resins led the sales parade with approximately 700 million lb. of material. Of this



*Source: U. S. Tariff Comm. and MODERN PLASTICS estimates.

Table I: Sales in pounds of synthetic resins and cellulosics, including surface coatings, in 1956[a]

Cellulose plastics		
Cellulose acetate and mixed esters		
Sheets under 0.003 gage	20,200,000	
Sheets 0.003 gage and over	16,500,000	
All other sheets, rods, and tubes	7,400,000	
Molding and extrusion material	90,000,000	
Total		134,100,000
Nitrocellulose sheets, rods, and tubes		4,500,000
Other cellulose plastics, primarily ethyl cellulose		5,000,000
Phenolic and other tar-acid resins		
Molding materials	195,000,000	
Laminating resins	76,000,000	
Abrasives	15,000,000	
Friction materials, brake linings, etc.	16,000,000	
Plywood	36,000,000	
Thermal insulation binder	50,000,000	
All other bonding resins	28,000,000	
Protective coatings	26,000,000	
Miscellaneous	27,000,000	
Total		469,000,000
Urea and melamine resins		
Textile-treating and textile-coating resins	40,000,000	
Paper-treating and paper-coating resins	24,000,000	
Bonding and adhesive resins for plywood	100,000,000	
All other bonding, including laminating	23,000,000	
Protective-coating resins straight and modified	27,000,000	
Resins for all other uses, including molding	93,000,000	
Total		307,000,000
Vinyl resins		
All types, including chloride, saran, butyral, polyvinyl acetate		700,000,000
Styrene resins		
Molding materials	390,000,000	
Protective-coating resins, straight and modified	94,000,000	
Resins for all other uses	104,000,000	
Total		588,000,000
Alkyd and rosin modified coatings		490,000,000
Coumarone-indene and petroleum polymer resins		250,000,000
Polyesters		60,000,000
Polyethylene		507,000,000
Miscellaneous types		150,000,000
Grand Total		3,664,600,000

[a]Source: U. S. Tariff Commission, first eight months; last four months estimated.

amount about 560 million lb. was vinyl chloride-type resins, including the copolymers. The remainder was saran and polyvinyl-acetate, -butyral, -alcohol, -formal, and -carbozol. Vinyl chloride increased more than 30 million lb. over its record 525 million lb. in 1955, with a small gain for every one of its various end use classifications.

The decline of automobiles from 8 million to 6 million meant a 12- to 15 million-lb. loss for vinyl resin that had to be picked up in other fields.

Polyvinyl acetate was largely responsible for the increase in vinyls exclusive of the chloride types.

Styrene-type resins were second in sales volume, although molding material sales dropped off somewhat in the last six months of the year after a start in the first five months that made optimists hopeful of approaching a 430 million-lb. mark in 1956. A decline in polystyrene housewares was one reason for failure to gain ground, but the industry expects to more than make up that loss in packaging applications and expanding uses for high-impact sheet. Styrene foam for insulation applications is another new and promising market.

Polyethylene was always in the news during the year. Total sales of a little over 500 million lb. included 140 million lb. or more of exports. Capacity at the end of the year was estimated at close to 650 million lb., exclusive of low-molecular-weight wax-type material. All of the 650 is high-pressure-processed material. Only a small amount of low-pressure-processed material from semi-works plants is on the market; commercial plants won't be on stream until mid-1957. Industry highlights were announcements that polypropylene would be available in a few years and the development of new intermediate-density resins by high-pressure-process producers.

The thermosetting resins—phenolic, melamine, and urea formaldehyde—were about the same in 1956 as in 1955, with phenolic down a few million pounds and melamine showing a 12 or 15% increase due to a steadily increasing dinnerware market.

The cellulosics had a record year spurred on by increased uses for vacuum formed acetate and butyrate sheet and—a new item in an old field—ladies' shoe heels, made from cellulose acetate.

A complete review of the year in all plastics materials starts on the facing page.

Materials progress–1956

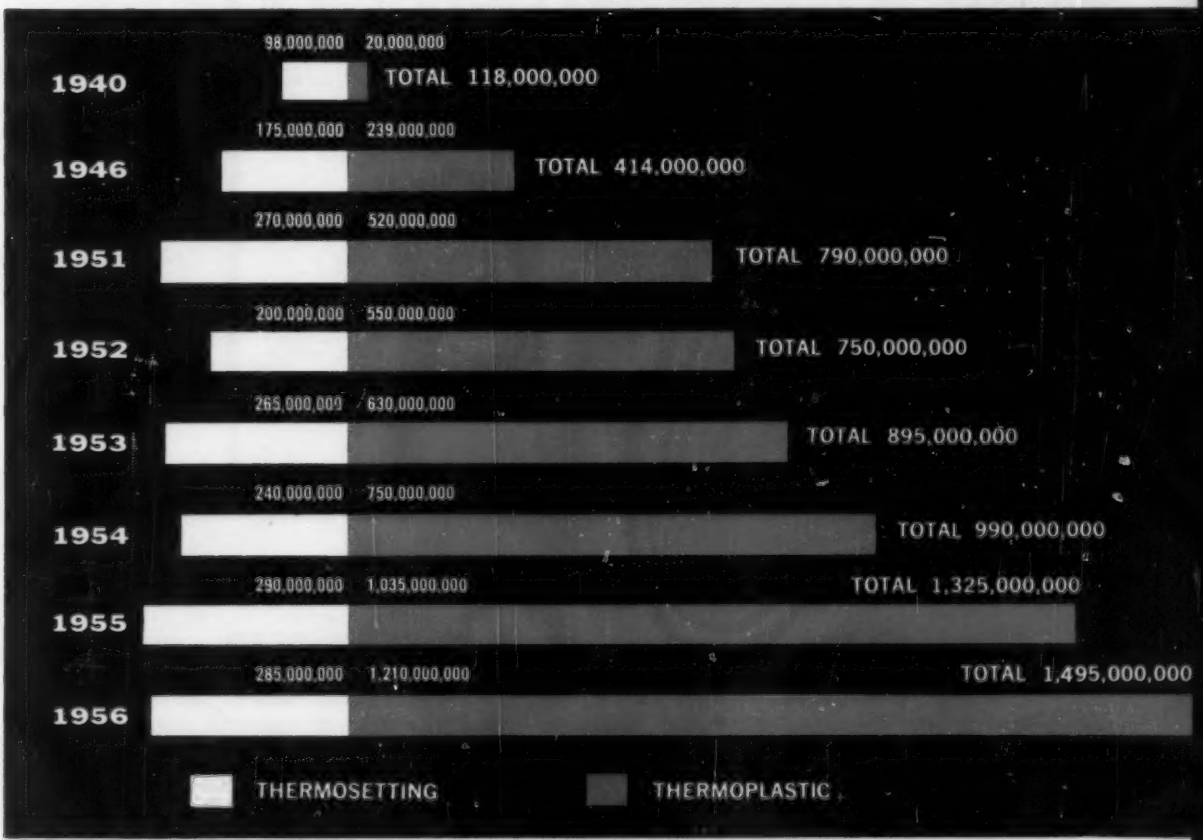
Phenolics

A review of the phenolic molding powder situation in 1956 could well start out—"read the review in January 1956 for what happened in 1955 and you will know what happened in 1956." There was almost no change. Even the sales figures are almost identical, according to latest reports. However, there are some in the industry who believe that the final four-month figure may be high enough to make 1956 a few million pounds over 1955.

The first half of the year started off in record fashion with sales around 17 to 18 million lb. in each of the first five months. The industry always has a contented feeling when molding powder sales are 17 or 18 million lb. a month and a rich feeling when sales are as high as 20 million pounds. That 20 million figure has only been reached two or three times in history. Apparently the industry is geared to prosper nicely when it is consuming over 15 million lb. a month, although capacity for producing molding powder is estimated at 35 million lb. a month or more and molding capacity may be even greater.

When sales dropped to 16 million lb. in June, 13 million in July, and 14 million in August, no

Sales of molding and extrusion materials in pounds, 1940 through 1956[a, b]



[a]Includes extruded film, except cellulosic film.
[b]Includes fillers, except for vinyls. Figures based on U.S. Tariff Commission reports, except for estimated last four months of 1956 and adjustments made in Tariff reports in "miscellaneous molding" category.

in Plastics Consumption

1956 — New Records Set

Phenolics

Molding powder sales in 1956 were about the same as 1955 at around 200 million pounds. Improved resins speed up molding operations and a new coating for coloring phenolic parts is on the market, but no large new applications showed up in 1956. Total for laminates was down slightly due to slump in decoratives caused by housing and furniture decline, but industrial laminates, led by new phenolic bases for printed circuits, had one of the best years since the war. Phenolic adhesives for softwood plywood increased in spite of lower plywood volume in 1956. Foundry core resin business still is one of the most promising in phenolic classification but needs several years to develop large-volume use. Full details on phenolics start on p. 87.

Urea and melamine

Continuing growth of melamine dishware is outstanding feature of urea and melamine history in 1956. Estimated use was around 30 million pounds. Urea molding material was about same as 1955. Possibilities for expansion of both urea and melamine in larger molded pieces have not yet materialized in big volume but look promising. Use of urea adhesives for hardwood plywood has doubled since 1953—most of it used for furniture. Textile and paper treating resins show small but consistent growth over a period of years. Full details on urea and melamine start on p. 92.

Cellulosics

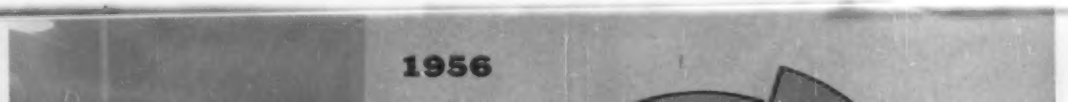
Cellulose acetate shoe heels and film, butyrate telephones and sheeting were instrumental in moving up the total cellulosic consumption in 1956. Acetate molding material finished the first half about 15% below 1955, but the new shoe heel business, plus fall deliveries for Christmas business, brought the industry up to record output. A 3¢ price increase tacked on by some of the producers in early fall came at about the same time volume began to mount. Vacuum formed items give acetate and butyrate big new potentials, but other film uses have also been rapidly increasing. A new 88-gage film for wrapping produce and food at the store level is expected to have big volume in 1956. Full details on cellulosics start on p. 93.

Acrylics

Molding declined in early part of year but picked up again in fall when new auto models were put in production; otherwise, not much change in 1956 activities. Look is to future rather than today. A new producer will soon be in the field. Older producers expanding present facilities. Price for molding powder has declined from 70¢ a few years ago to 55¢ today. Greater use for extruded sheet expected in the near future. A new methacrylate lacquer for automobiles and acrylate latex paints make the coatings field look promising. Use of methacrylate resin for reinforced plastics is also a future possibility. Full details on acrylics start on p. 96.

particular alarm was felt because sales always drop in the summer, particularly in July when many plants close down for vacations. But the last four months didn't come back quite as strongly as in 1956, so far as could be told when this was written. Consequently, the first half year's sales of molding powder exceeded the second half by 7 or 8 million lb., which is the reverse of customary procedure.

Furious fluctuations—Two years of almost the same sales volume in phenolics is an unusual occurrence. The 1950-1951 years were fairly close at 195 and 205, but the chart on page 91 shows that fluctuations in phenolics over past years have been wild and furious. Peaceful progress in the phenolics industry doesn't seem possible if the past record is any criterion. Only the pessimists believe that molding material will settle down to a 200 million lb. a year volume with small annual increases based on population growth. The old timers welcome a more violent up and down progress because



in Plastics Consumption

Polystyrene

Molding material remained about the same as in 1955. Refrigeration is still the leading end-use item with approximately 20% of the total. Housewares fell off in 1955, but the loss was picked up by additional packaging items. Toys retained about the same poundage in 1956 as in 1955. High-impact material is thought to be about 45% of total molding and extrusion volume. Styrene-acrylonitrile copolymer is beginning to pick up new markets. Price reduction was important aspect of year's activities. One big new producer will enter field in 1957 with general-purpose material that has higher heat resistance. Full details on polystyrene start on p. 97.

Vinyl chloride

Vinyl chloride resins grew from 520 million in 1955 to almost 560 million lb. in 1956. Largest increases were in sheeting and floor covering. Most of sheeting growth was due to large quantities used for laminating to fabric for use as upholstery. Calender- and spread-coated fabric were affected by both drop in automotive industry and laminated fabric. Large future potentials are expected from new developments in coating resins for application to metal —one by conventional spray, the other by a new spread-coating process. Floor coverings grew substantially, even though warehouses were well filled up in 1955. Total capacity of vinyl chloride resin industry is or soon will be 1 or 2 hundred million lb. more than consumption. Full details on vinyl chloride start on p. 99.

Polyethylene

Estimated sales were slightly over 500 million lb. in 1956 compared to 350 million lb. in 1955. Somewhere between 140 and 155 million lb. is believed to have been exported in 1956. Total capacity of the industry was around 650 million lb. at end of 1956—between late 1957 and end of 1958 capacity may grow to well over 1 billion pounds. Low-pressure-processed polyethylene plants probably won't have commercial quantities for large distribution until after June 1957—doubtful that more than 50 million lb. will be sold in 1957. Important event was announcement that higher - density resins would be produced in high-pressure plants. Full details on polyethylene start on p. 103.

Nylon

Two more companies announced that they were planning to build facilities for production of nylon plastics. Both will use caprolactam as base material and concentrate on production of nylon for extrusion and large molded pieces. Original producer of nylon in the United States announced expansion of facilities and also production of a new extrusion grade. Production of nylon in 1956 increased moderately over 1955 with no significant change in type of applications produced but with indications that use in automotive parts may soon grow from less than ½ lb. to well over 1 lb. per car. Full details on nylon start on p. 105.

every time it goes up it generally goes like a skyrocket and hangs there for a while; then when it drops, it never drops as far as previous declines and the end result is more poundage over a long period. It's like a company dropping prices to pick up new customers; when they raise the price back up, a few of the new customers generally stay with them and they've increased their customer list.

One encouraging factor about the 200 million-lb. volume in 1955 and 1956 is that it cancelled out the 20 to 30 million-lb. loss in television cabinet business in 1954. And it was accomplished without the addition of any large new applications. The industry has been hunting for some new application that would give phenolics the same boost that television cabinets did in 1953. It may be in the trunk right now, but if it is, nobody has come forth with an announcement. Yet there is always the chance that some molder or designer will spring such an item at any time. It is this sort of thing that

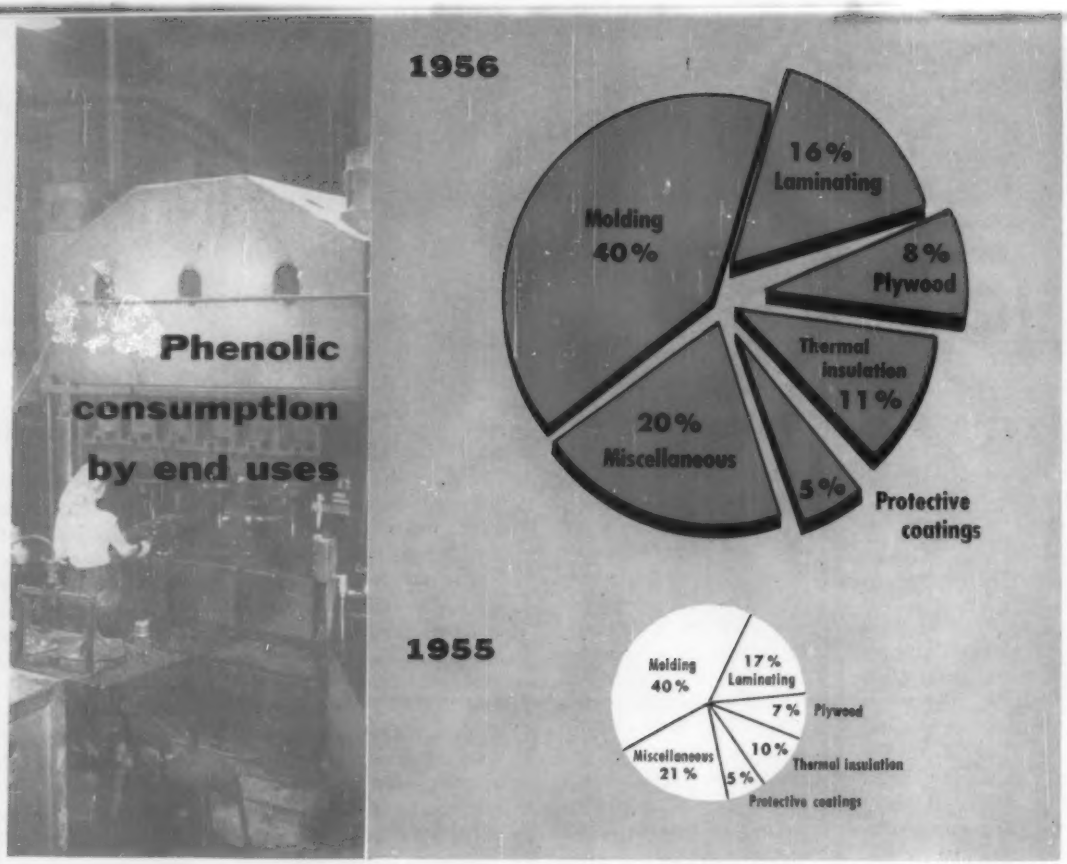


Table II: Phenolic resin sales[a,b]

Use	*1953*	*1954*	*1955*	*1956*
	lb.	*lb.*	*lb.*	*lb.*
Molding materials	204,000,000	172,000,000	200,000,000	195,000,000
Laminating resins[c]	71,000,000	64,000,000	82,000,000	76,000,000
Abrasives	12,000,000	11,000,000	16,000,000	15,000,000
Friction materials, brake linings, etc.	20,000,000	15,000,000	22,000,000	16,000,000
Plywood	34,000,000	28,000,000	36,000,000	36,000,000
Insulation for rock wool, fibrous glass	21,000,000	37,000,000	52,000,000	50,000,000
All other bonding resins	18,000,000	13,000,000	27,000,000	28,000,000
Protective coatings	26,000,000	22,000,000	25,000,000	26,000,000
Miscellaneous	28,000,000	27,000,000	29,000,000	27,000,000
TOTAL	434,000,000	389,000,000	489,000,000	469,000,000

[a]Source: U. S. Tariff Commission, except last 4 months of 1956, which is estimated.
[b]All on solid resin basis, except molding materials, which includes about half filler.
[c]Production figure used instead of sales figure because there are so many captive plants.

has kept the industry in a state of delightful anticipation ever since the late 1940's when supply caught up with and went ahead of demand. For a time it was thought that furniture drawers would be the long sought invigorator for phenolics. They are in use but only to the extent of about 200,000 pounds. A multitude of different sizes that require expensive molds and a backward tendency on the part of furniture manufacturers to adopt new materials are two of the problems faced. Thermoplastic drawers may offer competition, but they offer problems too. There is that same reluctance to adopt a new material, plus a susceptibility to attack by moth balls.

Table III, p. 92, showing estimated end uses is not offered as an accurate measure of volume for each item because it is impossible for sup-

pliers to know where each pound goes. The electrical parts and miscellaneous classifitions are particularly difficult to analyze because they are classified differently by different companies.

The electrical parts segment is by far the biggest single phase of the phenolic molding industry and its volume is directly related to the construction industry which should be greater in 1957 than in 1956. As long as the huge expansion in electrical power output continues, the demand for phenolic parts will increase and that should be for years to come. About the same can be said for wiring devices, although the increase is cut down somewhat by competition from urea and vinyl.

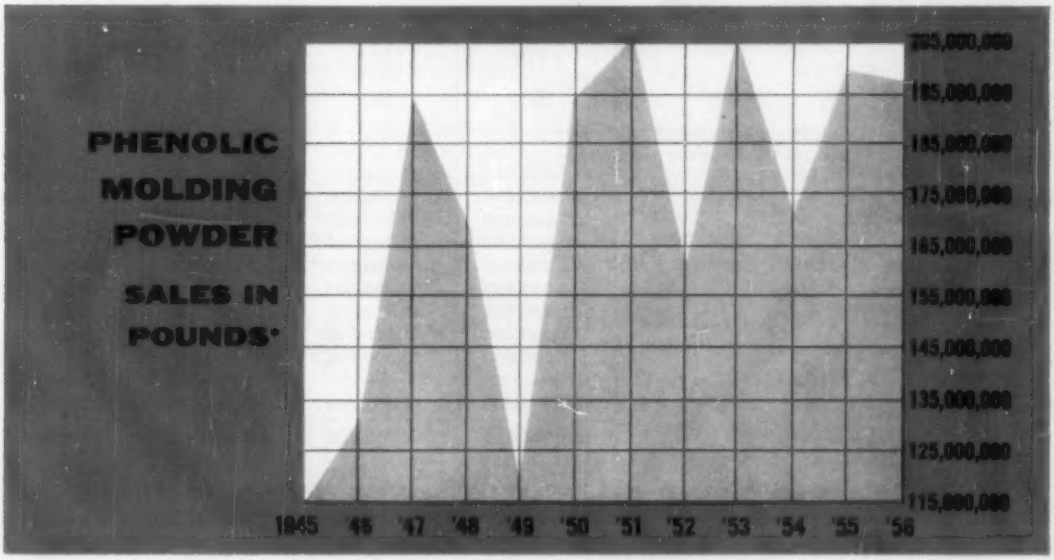
Radio cabinets, once a potent factor in the phenolic business, are now mostly urea and polystyrene. About the only phenolic left in television sets is in tuners and tube bases. However, there is a fair amount of phenolic used in housings for intercom "squawk boxes." **Use in telephones** is still substantial, but the cellulosics are cutting in; the full effect of this invasion may not be felt until 1959, but there will always be a good quantity of black phenolic telephones—they cost less.

The advent of new type automatic washers, some of which have no agitators, has not hurt phenolics to any extent. The loss in agitators is made up by use of phenolic impellers, pump housings, and other parts.

A growing part of the phenolic molding industry is utensil and appliance components. New electrical units such as rotisseries and frying pans are coming out of manufacturers' plants in a constant stream and many of them are using more and larger handles. This market seems safe for years because most other plastics won't take the heat or are too costly. A lower priced melamine might be a threat because of color, but the new epoxy spray or dip coat for phenolics could take care of that problem.

Among the miscellaneous uses for phenolic molding powder are such things as 8 million lb. for camera parts, which continue to grow; perhaps 400,000 lb. for buttons; and there should be some few million pounds for military uses not included in any other classification. No estimates are available on such items as toilet seats and caster wheels, but many of the miscellaneous items use well over a million pounds a year.

The above discussion deals with old, well-known applications. Perhaps one reason there is nothing different, application-wise, is because there have been no radically new low-cost formulations for many years. Furfural, bis-phenol, and many other chemicals, as well as a wide



* Source: U. S. Tariff Commission, except last 4 months of 1956, which is estimated.

variety of fillers such as walnut shells and cashew nuts, bagasse, and even dried orange pulp, have been tried without increasing the market to any sensational degree.

Between 45 and 50% of all the phenolic molding material used is general-purpose stock which, incidentally, was raised 1¢ a lb. in price last summer for the first time in several years. There are many other formulations, generally distinguished by the type of filler used, and their price ranges from 20 to over 90 cents.

Phenolic fillers in current use, in addition to those mentioned before, include rubber, fibrous glass, sisal, rag, cotton flock, mica, and asbestos. They are intended to give greater flexibility, impact, heat resistance, or some other property, but all such combinations with phenolic cost more than the wood-filled general-purpose. Most of them are for specialty purposes and are also more difficult to mold. The prospective user frequently won't pay the extra price because his product won't bear the extra cost or the better property doesn't seem to be worth the difference.

Glass-filled phenolics in the 90¢ price range are an excellent example. They are fine for several electrical applications but are used only where nothing else can be applied. Rubber-phenolics are another. There are some good applications such as insulation for tool handles, but the particular properties of additional impact and flexibility which are gained are not enough to make the material compete on a big scale with lower-cost general-purpose material or even to find a big new market—at least not yet.

By far the largest use of filled phenolic molding material next to (*To page* 199)

Urea and melamine

Growth has been steady in the urea and melamine resin business for 10 years, with less commotion made about it than about any other material in the plastics industry. Every now and then there is a big surge of interest when some new producer of urea chemicals examines the future possibilities of urea molding powder or hears about the oft-discussed possibilites of producing a lower cost urea molding powder or even a lower cost melamine derived from urea; but, so far, none of them have come into the urea and melamine molding powder business. Several firms have been organized to produce urea molding powder since the end of World War II, but the volume of these companies is

Table III: Phenolic molding powder end use volume

End use	1953 lb.	1954 lb.	1955 lb.	1956 lb.
Electrical control parts (panel boards, switch gear, etc.)[b]	38,000,000	39,000,000	31,000,000	35,000,000
Housings, including television	40,000,000	17,000,000	10,000,000	9,000,000
Wiring devices	28,000,000	26,000,000	23,000,000	23,000,000
Closures	18,000,000	15,000,000	17,500,000	17,000,000
Utensil and appliance handles	18,000,000	15,000,000	10,000,000	12,000,000
Telephones	6,000,000	5,000,000	5,500,000	5,000,000
Washing machines	12,000,000	10,000,000	11,000,000	10,000,000
Automotive	8,000,000	6,000,000	9,000,000	7,000,000
Vacuum tubes	6,000,000	5,000,000	6,000,000	6,000,000
Radio and TV parts	—	—	2,000,000	2,000,000
Miscellaneous[a]	30,000,000	31,000,000	75,000,000	79,000,000
TOTAL	204,000,000	169,000,000	200,000,000	205,000,000

[a]Miscellaneous includes such things as caster wheels; textile machinery; office equipment; buttons; camera parts; toilet seats; vaporizers; and exports.
[b]1953 and 1954 included a great portion now included in miscellaneous because of variations in individual company classification.
NOTE: Figures above are all estimates; table is to be used onlyas an approximation to show trends.



Table IV: Urea and melamine resin sales[a]

Uses	1953 lb.	1954 lb.	1955 lb.	1956 lb.
Textile treating and textile coating resins	35,000,000	39,000,000	41,000,000	40,000,000
Paper treating and paper coating	22,000,000	20,000,000	23,000,000	24,000,000
Bonding and adhesive resins for: Plywood	51,000,000	75,000,000	94,000,000	100,000,000
All other bonding and adhesive uses[b]	43,000,000	24,000,000	28,000,000	23,000,000
Protective coating resins, straight and modified	23,000,000	22,000,000	29,000,000	27,000,000
Resins for all other uses, including molding[c]	65,000,000	66,000,000	86,000,000	93,000,000
TOTAL	239,000,000	246,000,000	301,000,000	307,000,000

[a]Source: U. S. Tariff Commission, except last 4 months of 1956, which is estimated.
[b]This figure includes resin used for waste-wood, melamine laminates, commercial glue.
[c]Includes filler for molding material.

not large compared to that of the two major producers.

Every classification in the urea and melamine group has contributed to the over-all growth. Textile and paper treatment consumption increased from 27 million lb. sold in 1949 to 64 million in 1956 and protective coating resins from 13.5 million to 27. And a big jump ahead is expected if the new melamine surface coating for automobiles catches on. Molding and miscellaneous uses, exclusive of laminating, have grown from 40 million to 93 million lb. and bonding or adhesive resins from 45 million to 123 million pounds.

Big growth in urea adhesives has occurred in spite of a chaotic situation which has existed ever since the late 1940's. Vicious price cutting, entry of a whole host of big and little companies into the business, and vigorous competition from other low-cost glues all contributed to the chaos. In addition, the adhesive had to be sold primarily to the hardwood plywood industry which is perhaps one of the most cost conscious, irregular, uncertain, price fluctuating industries in existence. It consists of scores of units, many of them very small, but each one strictly individualistic.

But, somehow or other, urea resin adhesives for plywood have managed to increase in volume by 2½ times since 1949. They are now well on the way to driving out all competition from starch, blood, soya, protein, tapioca, and other type glues in the hardwood plywood business. It is significant that even though the furniture and home building business declined in 1956, urea adhesives increased; chief use is in plywood for furniture, doors, and paneling.

The "all other" bonding uses for urea and melamine (Table IV) includes 7 or 8 million lb. for decorative laminates and resins used for household glues and waste wood, as well as various miscellaneous bonding (*To page* 202)

Cellulosics

Human heels are undesirable characters whose presence is unsought and unwanted. But shoe heels have suddenly become the most wanted and most welcome addition to the cellulose acetate industry that has come down the pike in many a year. These heels helped save the cellulose acetate industry in 1956 from perhaps the worst decline in the last five years and played a large part in changing an industry from one whose sales managers could put a carload of material on the way to a customer almost immediately upon receipt of the order to one in which four to five weeks' delivery

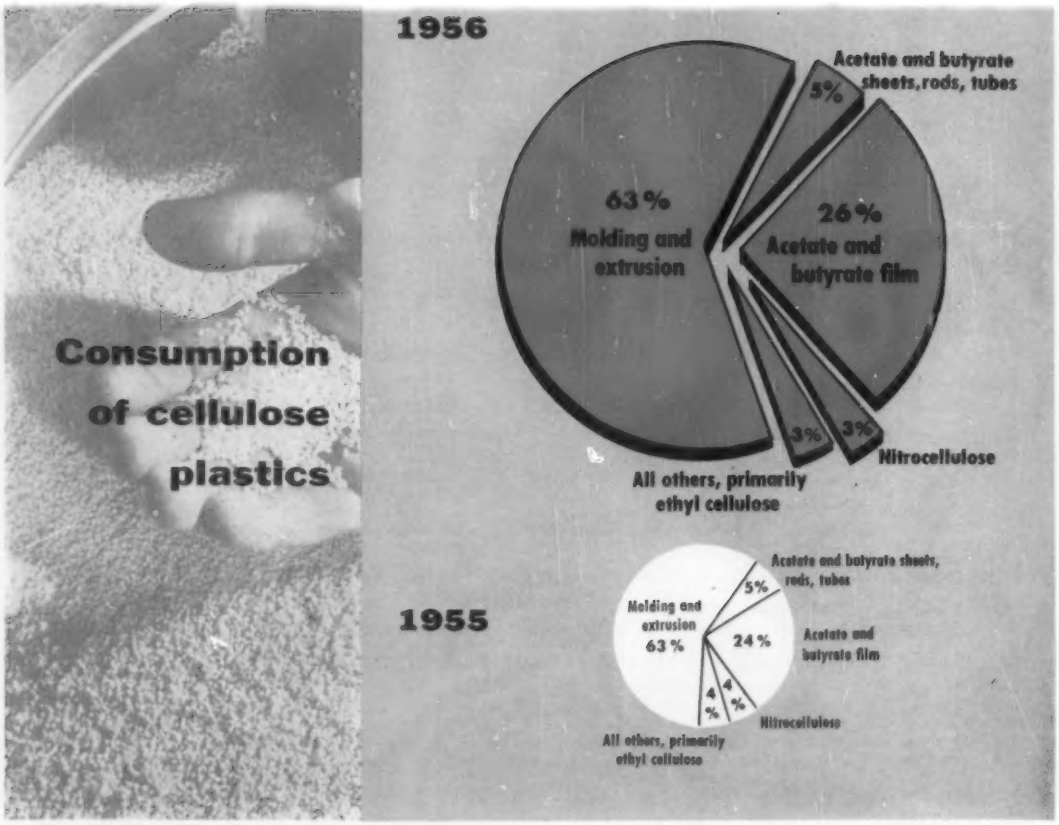


Table V: Cellulose plastic sales, 1953-1956[a,b]

Classification	*1953*	*1954*	*1955*	*1956*
	lb.	lb.	lb.	lb.
Cellulose acetate and cellulose acetate butyrate sheets:				
under 0.003 gage	17,200,000	17,500,000	19,000,000	20,200,000
0.003 gage and over	13,100,000	12,400,000	15,000,000	16,500,000
All other sheets, rods, tubes	5,200,000	5,300,000	7,000,000	7,400,000
Molding and extrusion materials	77,000,000	75,500,000	90,000,000	90,000,000
TOTAL	112,500,000	110,700,000	131,000,000	134,100,000
Nitrocellulose: sheets, rods, tubes	6,500,000	4,900,000	5,100,000	4,500,000
Other cellulose plastics, primarily ethyl cellulose	6,400,000	5,000,000	5,400,000	5,000,000

[a] Source: U. S. Tariff Commission, except last 4 months of 1956, which is estimated.
[b] Includes plasticizers, fillers, and extenders.

time was the best that the buyer could be promised.

The discovery that cellulose acetate shoe heels were ideal for ladies' shoes came late in 1955.

Shoemakers like them because of their resilience and toughness. It is claimed they are 2 to 4¢ less costly per pair than wooden heels with lacquer applied. Furthermore, they can be nailed whereas the other most commonly used plastic for heels had to be drilled and screwed, cost more, and was only used on high style shoes. Acetate heels are amenable to use on most any high heeled shoes. They are molded in 1-min cycles in 4- to 16-cavity molds. Mold makers have been busy providing molds ever since last spring. One lb. of material will make five pairs of heels. Consumption of acetate for

heels was estimated at least as high as 500,000 lb. a month by the end of 1956.

It is also estimated that 300 million pairs of ladies shoe heels will be produced in 1957, 400 million a year by 1960. At five pairs/lb., that 1957 volume would take 30 million lb. of acetate, but no one expects to win the complete market. The plastics industry will settle for 6 or 7 million lb. in 1957 but expects to gain more in later years.

Heels did it—The importance of shoe heels to acetate can be realized when it is pointed out that acetate sales were down 15% in the first half of 1956 but came back strong enough in the last half to make 1956 one of the largest on record. An increase in fall business for dolls and toys contributed to this happy result, but shoes are credited with certainly the major portion of the upswing. Furthermore, the increase continued after a price raise by two of the producers for Group III materials. Group III is the low-cost opaque acetate generally used for shoe heels, dolls, toys, and the like. The price increase was from 35 to 38¢ for one color, 39¢ for split colors. Translucent and metallic acetate, or Group II, is still 46¢ and the transparent type is 50 cents.

The first half-year decline was caused by a drop in business for dolls, toys, beads, telephones, and handbags. Davy Crockett was one of the culprits in the toy industry. When the fad for Davy's assorted replicas wore off, the loss to acetate was severe. But other toys picked up in the fall—a little better than usual. Acetate for dolls has suffered a decline because of slush-molded vinyls. Cellulosic dolls may not be more than 20% of the whole today but a few years ago they were almost 100 percent. Acetate bead business was hurt by the polyethylene poppets, but that is probably a temporary loss. Customers like the sparkle and toughness of acetate, plus the ease with which it can be pearlized and it is expected that the bead business will grow again. In 1954 and 1955, beads were a 5 to 6 million-lb. business. They may have been down more than 2 million lb. in 1956.

There was also a big increase in acetate exports in 1956—from 8 million in 1955 to an estimated 12 million lb. or more in 1956. Acetate was short in Europe because the textile industry there used more acetate flake and the Europeans have developed a big export market in acetate moldings. Italy is even exporting acetate sheet to the United States.

The cellulose acetate decline in early 1956 was not apparent from the Tariff Commission's monthly reports. Cellulose acetate butyrate is also reported in this classification and, because of its increasing sales, was the major contributor toward keeping 1956 cellulose moldings a bit higher than in 1955 during the first half of the year. At least 50 million lb. of the year's total 90 million lb. is thought to be butyrate. A large part of the butyrate molding material volume is for telephones. A portion is in extruded sheet, a rapidly growing item, especially for signs. Housings in butyrate continue on the "up" side and automotive is still big despite the decline in butyrate steering wheels. Football helmets are an interesting if not particularly large volume application. However, a football broadcaster recently took great pains to explain that Tenite helmets were *not* plastic. How about that? It seems that

Exports relating to plastics (in millions of pounds)

Material exported	*1954*	*1955*	*First 8 mo. '56*
Phenol	45	37	29
Benzol and benzine (million gal.)	5.9	2.5	2.4
Phthalic anhydride	11	18	5
Urea and melamine plastics	17	16	12.5
Cellulose acetate molding material	5.7	8.6	[a]
Cellulose acetate plastics for other uses	8.9	11.2	[a]
Vulcanized fibre	5.6	6.5	4.2
Styrene polymer and copolymer resins	33.3	44	39
Vinyl and vinyl copolymer resins, uncompounded	31.5	35	20
Vinyl and vinyl copolymer resins, compounded	10.8	16	11
Resins not otherwise classified[b]	44.5	80	107
Laminated and molded not otherwise classified	4	4	4.5

[a]Figure not comparable in 1956, but it is much higher than 1955.
[b]Major portion is polyethylene.

. . . developments looking toward future of acrylics . . .

the industry still needs an educational program.

The comeback of all cellulosics in the last half of 1956 lived up to the industry tradition of increased sales in the latter period. September, October, and November in 1955 was the largest three-month volume in history—about 26 million pounds. The same period in 1956 may be even larger.

The new higher-cost cellulose materials, Forticel (cellulose propionate) at 62¢ and Hercocel W (high-acetal acetate) at 56¢ are just beginning to find their various niches in the industry.

Forticel is more stable than straight acetate, has low plasticizer content, no odor, weathers well, and is noted for a sparkling finish. It is particularly applicable to pens and pencils but is aimed at the same markets as butyrate. Eventually it may be available in film and sheet.

Hercocel W is harder than other cellulosics and can be boiled for long periods. It molds at 550 to 600° F., has a critical range, and requires special techniques if used in large moldings—but molders are learning how to handle it. Its flow properties make it suited for multi-cavity injection molding, pin-point gating, molding around inserts, and welding. Its excellent dimensional stability, hardness, and lower water absorption than any other cellulosic make it ideal for cutlery handles and suggested for pencils, combs, vials, clock and radio housings, camera cases, toothbrush handles, telephones, knobs, oil containers, and machine keys.

A new type ethyl cellulose formulation has helped to create new interest in that material. It is suggested for moldings where self-lubrication is desirable and may be used sometimes where nylon has been considered. At 72¢ a lb., it is much lower in cost than nylon. One of the applications now in use is for rollers on garage doors. Other uses for ethyl cellulose as in other years are vacuum cleaner parts, end pieces for luggage, and in military applications such as the radiosond. Volume for strip-coat, paint and varnish lacquers, and in phonograph records is about the same as in other years. Export was good in 1956, especially for records.

The film and sheet section of the cellulosics industry was oversold throughout the year; that is, demand was above capacity, but additional capacity will be available in 1957. The new Celanese plant for film over 0.003 gage started one unit in mid-1956 and will add more in 1957. Eastman Kodak added another extruder for film and sheet in early 1956 and is reported to have operated two machines around the clock ever since at a consumption rate of 300 lb. an hour.

One of the most promising—perhaps it will be sensational—uses for acetate film in 1957 will be Celanese's new S-652 #88-gage extruded film for wrapping fresh fruit and produce at the retail level. It is reportedly lower in price than cellophane. Many (*To page* 204)

Acrylics

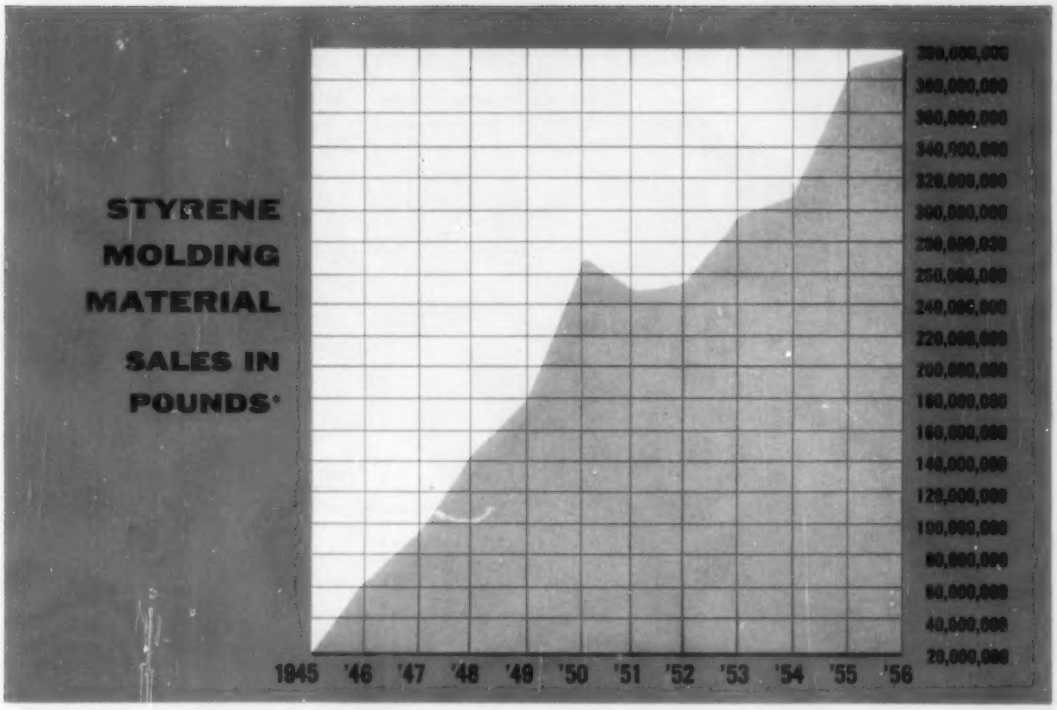
Methyl methacrylate activities in 1956 were dominated more by speculation and developments looking toward future potentials than by any unusual happenings in applications.

There were price reductions, improved resins, public announcements of a new type coating for automobiles, plans for entering other fields, increased activity by companies which have stepped up their casting operations, and announcements of expansion plans by raw material producers, plus the entrance of a new producer into the field.

The new producer is Hawthorne Chemical Co., a joint enterprise of Hercules Powder Co. and Imperial Chemical Industries, Ltd., of England. Its new $11 millon plant, with an annual capacity of 35 million lb., will be built on Hercules' 20-acre site at Louisiana, Mo., near Hannibal, Mo., adjoining Hercules' Missouri Ammonia Works where the ammonia and methanol required for methacrylate will be produced. The needed natural gas will come from a nearby pipeline and the acetone from Hercules' New Jersey plant. I.C.I. is a pioneer in methacrylate production and will supply production, research, and technical know-how developed over 20 years of experience. The new company should be ready to go on stream in 1958.

Du Pont announced doubling of its present capacity. Rohm & Haas made no announcement in 1956 but has been expanding steadily for several years and expects to mantain its position as leading volume producer. General Aniline is still working to perfect its high heat-

1956



* Source: U. S. Tariff of Commission, except last 4 months of 1956, which is estimated.

resistant methacrylate called Gafite, but so far at least its price structure has limited application to the military field.

Capacity—Du Pont and Rohm & Haas never talk about their respective capacity, but analysts place the R & H possible volume in a range of from 60 to 75 million lb.; they also guess that the new expansion will put Du Pont in the 50 million-lb. range. Thus the total should approach 160 million lb. when the Hawthorne plant is ready to operate.

It is doubtful that as much (*To page* 207)

Polystyrene

Sales of polystyrene pursued an irregular course in 1956 that defies a satisfactory explanation. The total of 390 million lb. for molding materials in Table VI is probably optimistic and will be achieved if November and December sales showed a big upsurge as they did in 1955 and to a lesser degree in 1954. One producer's estimate, made in September, was that 1956 sales would be 10 million lb. under 1955.

A further complicating factor insofar as sales statistics are concerned is that something like an estimated 12 to 14 million lb. in 1955 and 20 to 25 million lb. in 1956 was unreported to the Tariff Commission by companies known to be polymerizing styrene. If they were added, the total in 1955 would have been about 397 million and perhaps 412 million in 1956. In any case, the polystyrene molding business leveled off in 1956 compared to the almost 80 million-lb. gain it made in 1955. Critics contend that this leveling off is the result of competition from other resins, but polystyrene producers point out that almost the same "leveling off" occurred in 1954 before the big upsurge in 1955 and that it is not a permanent feature. They believe that improved resins, lower price, a big increase in packaging and disposable items, and additional applications for high-impact resins will result in a steadily rising sales curve for years to come, one that will keep well ahead of the normal growth caused by population increases.

The 1956 sales year for polystyrene opened up with a tremendous spurt in the first five months with total sales of 180 million lb., or at a rate of over 430 million lb./year. April, with 40.6 million lb., was the largest volume month on record. It was by far the greatest five month period in polystyrene history. Even with the sudden drop of from 38 million lb. in May to 29

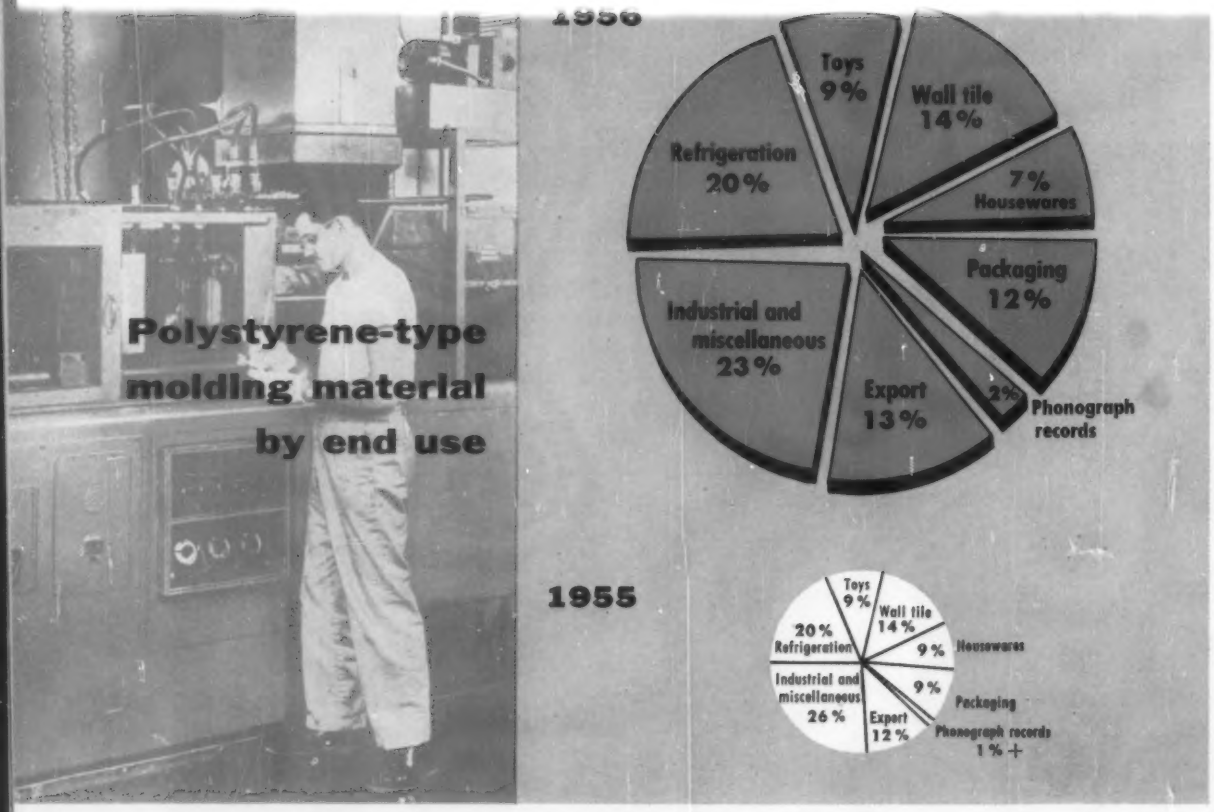


Table VI: Styrene resin sales, 1953-1956[a]

Use	*1953* lb.	*1954* lb.	*1955* lb.	*1956* lb.
Molding materials[b]	298,000,000	309,000,000	386,000,000	390,000,000
Protective coating resins[c] (straight and modified)	82,000,000	80,000,000	94,000,000	96,000,000
Resins for other uses[d]	88,000,000	68,000,000	92,000,000	104,000,000
TOTAL	468,000,000	457,000,000	572,000,000	590,000,000

[a]Source: U. S. Tariff Commission, except last 4 months of 1956, which is estimated.

[b]Includes plasticizers, fillers, and extenders; modified and copolymer molding or extrusion materials; resin for foam made from beads but not that sold in expanded form which is reported in "Resins for other uses." One producer does not report.

[c]Includes high styrene-butadiene resin for latex and paper treatment; also resin for styrenated alkyds.

[d]Includes high styrene-butadiene rubber reinforcing resins; ion exchange resins; polysytrene used in flooring; metal treating resins and prefabricated polystyrene foam. Before 1955 this figure also included polyester resins that require styrene monomer.

in June, the six months' total was close to 210 million lb. and the industry looked forward to another big year. In almost every other year the second half had been larger than the first, but sales in September 1956 failed to show the gain expected, and at last report the final quarter sales were under 1955 which, incidentally, was the largest volume quarter of record. There is a belief in the industry that part of the reason for lack of a larger pick-up in the later months was caused by the slow start in the appliance industry in preparing for 1957. When that industry moves into heavy production in early 1957, the demand for polystyrene in refrigerators will again mount rapidly.

Producers are planning a good increase in 1957 regardless of the 1956 leveling off. Some of them even expect an 80% increase by the end of 1960. That would be a 700 million-lb. rate of operation. Capacity today is estimated at from 500 to 550 million lb., exclusive of the new American Cyanamid plant; but producers are prepared to expand rapidly if sales indicate they are about to catch up with production;

they will also offer a variety of resins tailored to have properties specifically defined for each different type of application. The old general-purpose polystyrene is still useful, but if the industry is to grow, that growth will have to be built on the efforts of researchers who are concocting new formulas to replace the old and built-in properties that will give such things as better heat and light stabilization, more flexibility for thin walls, faster molding, transparency for high-impact, and (*To page* 209)

Vinyl chloride

Like a freight train "hi-balling" across the nation to break all records, the vinyl chloride dustry is to grow, that growth will have to be speed. But the ratio of increase was considerably slower in 1956 than in 1955. The engine simply couldn't keep on increasing its rate of speed as fast as in 1955 because the load it was pulling was too heavy, especially since new cars of added weight were hooked on to the train throughout the year. In other words, the industry grew so fast in 1955 that its rate of growth had to slow down in 1956 in order to consolidate its gains, to smooth out the production, sales, and merchandising problems of its more than a 100 million-lb. increase in 1955. But even while going through this consolidation stage, the industry managed to pick up an additional increment of 35 million lb. or thereabouts in 1956, which was no mean achievement and much better than most other plastics.

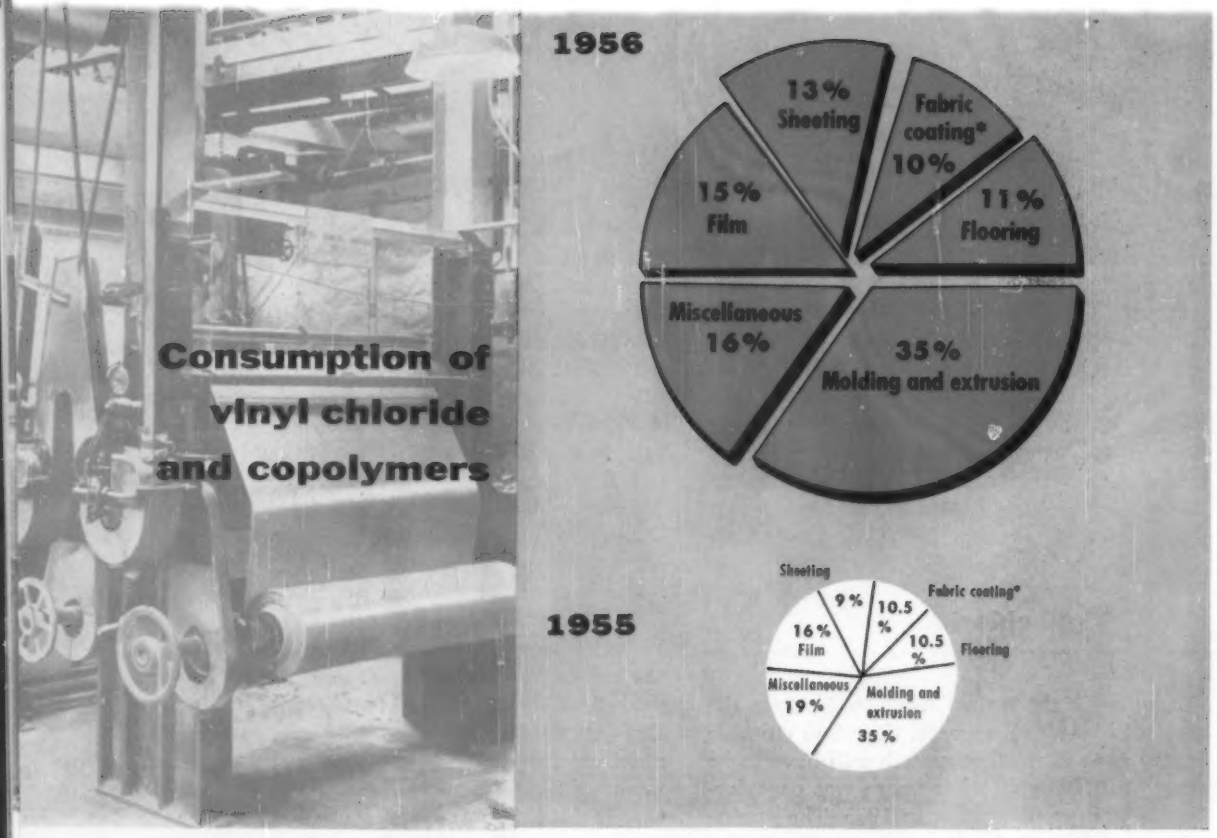
The percentage increase in 1956 was only 7 or 8% compared to more than 25% in 1955. If the industry expects to reach a billion lb. by the end of 1960, it will have to do better each year than the 35 million-lb. increase in 1956. But progress is never at a steady rate and vinyl chloride has never yet suffered a decline in any one year. In 1953, the increase was only 6%; in 1954, it was 15 percent. In 1952, sales were around 390 million lb. so the percentage increase since that year through 1956 is 43.

If the industry grows no faster than in 1956,

Table VII: Growth of products using plastics in large quantities

Products	*1946*	*1951*	*1954*	*1955*	*1956 (Est.)*
Air conditioners (retail sales)	30,000	237,500	1,230,000	1,240,000	1,600,000
Floor-type vacuum cleaners (retail sales)	2,289,000	2,729,100	2,650,000	3,330,000	3,750,000
Television sets (retail sales)	6,500	5,384,800	7,346,000	7,750,000	4,250,000
Refrigerators (retail sales)	2,100,000	4,075,000	3,593,000	4,025,000	4,250,000
Radios:[a]					
Home (retail sales)		6,751,400	3,140,000	3,525,000	
Portable (retail sales)	14,031,000	1,332,990	1,525,000	2,050,000	
Clock (retail sales)		777,155	1,750,000	2,225,000	9,750,000
Washing machines (retail sales)	2,124,000	3,384,700	3,610,000	4,350,000	4,560,000
Automobiles (factory sales)	2,148,699	5,336,935	5,352,000	7,942,000	5,900,000
Trucks and buses (factory sales)	940,851	1,428,328	843,500	1,245,000	1,100,000
Dwelling units (non-farm)	671,000	1,091,300	1,220,000	1,328,000	1,100,000

[a]Only the total for all types is available for 1956.



*Fabric coating does not include 10 million or more lb. of film and sheeting resin which is used as laminates with fabrics.

Table VIII: Vinyl chloride and copolymer consumption of resin produced in U. S., 1953-1956[a]

Use	*1953* lb.	*1954* lb.	*1955* lb.	*1956* lb.
Film under 10 mils	66,000,000	69,000,000	83,000,000	83,000,000
Sheeting 10 mils and over	60,000,000	55,000,000	51,000,000	71,000,000
Fabric treatment[b]	39,000,000	42,000,000	56,000,000	57,000,000
Paper treatment	6,000,000	7,000,000	8,000,000	8,000,000
Floor coverings	25,000,000	34,000,000	56,000,000	63,000,000
Molding and extrusion	115,000,000	148,000,000	183,000,000	198,000,000
Protective coating	22,000,000	23,000,000	26,000,000	28,000,000
Miscellaneous[c]	26,000,000	34,000,000	58,000,000	49,000,000
TOTAL	359,000,000	412,000,000	521,000,000	557,000,000

[a]Based on U. S. Tariff Commission reports, with various estimated alterations necessitated by more varied classifications.

[b]Laminates for fabric complicate this figure. For the purpose of this report, resin used for laminates is included in film or sheeting since it is produced in that form. More than 10 million lb. of resin was used in 1956 for laminates to fabric, the bulk of it in sheet form.

[c]Includes most of the resin for export, although resin for adhesives, ink, foam, and other unclassified products may be substantial. In addition, this figure allows for adjustment in the preceding classifications since it is impossible to pinpoint the various listings.

NOTE: It is believed that between 20 and 25 million lb. of resin will have been imported in 1956. Between 10 and 15 million lb. was probably used for film or sheeting. Total export for 1956 is estimated at approximately 40 million pounds.

the 1960 figure will be slightly over 700 million pounds. It would be around 800 million if the increase is 10% a year. But programming men are counting on a 12 to 14% a year increase, which would bring the 1 billion-lb. figure in sight in 1960. That would be more than a 90% increase in the last half of the 1950-'60 decade compared to a 43% increase the first half.

If this billion-lb. goal is to be achieved, the industry will have to hook another engine onto its train and run a double-header. That it is planning to do. The new engine will have some

new parts, such as improved and better resins as well as improved equipment for the processor and more knowledge on how to use it. It is also possible that lower prices may furnish more power. And then, of course, there are such vinyl products as plastisols, rigids, floor covering, wall covering, and foam which have a long way to go before they reach saturation. In addition, there are one or two applications lurking around which could rate with some of the better current applications, but the interested parties are not yet willing to lift the lid on them.

Sales problems—If this projected increase doesn't take place, the industry is going to have sales problems. Capacity in the past has always been comfortably ahead of sales, except for brief periods. The nine companies in production at the beginning of 1956 had a capacity estimated at near 700 million lb., although there is always a possibility that capacity will vary from 10 to 20%, depending upon the type of resin produced. The older companies are also prepared to make resin by several different methods, depending upon which variety is most profitable at the moment.

This capacity situation is due for a big change in the year 1957. At least eight other companies claim that they are now or will be in production by the end of 1957. Their total will be at least 150 million lb. or more. In addition, most of the original nine are or will enlarge by at least another 100 million pounds. Thus, a conservative estimate of capacity by 1958 or soon thereafter is 950 million lb. and still more is contemplated by companies still uncommitted. Consequently, it appears that there will be considerably more capacity than is needed for 1957 and 1958, even if the industry picks up another 100 million-lb. a year increase which seems unlikely at this writing.

Cautious analysts are extremely wary of that projected 1 billion-lb. sales figure for 1960. Several of them who represent highly respected research organizations have told their clients that 850 million lb. is the very utmost to be expected by the end of 1960. Even that figure is more than a 50% increase over 1956. Hard-boiled realists in the analytical fraternity insist that the billion-lb. figure by 1960 is only a dream that can't possibly come true unless some unusual applications should suddenly appear, and even then it will take more time for them to develop into big volume than the remaining four years of this decade.

There was some disappointment because the

Table IX: Pattern of consumption of calendered vinyl films*

Uses	1953 lb.	1955 lb.	1956 lb.
Draperies, bedspreads, kitchen and bathroom curtains	23,000,000	15,000,000	14,000,000
Yard goods	10,000,000	9,000,000	8,000,000
Adhesive-backed film	—	1,000,000	4,500,000
Closet accessories	6,500,000	7,000,000	7,000,000
Shower curtains	6,000,000	7,000,000	8,500,000
Nursery goods	4,000,000	4,000,000	5,000,000
Baby pants and liners	2,400,000	3,000,000	3,300,000
Table covers	4,000,000	4,000,000	3,500,000
Appliance covers	3,000,000	2,500,000	2,500,000
Furniture covers, indoor and outdoor	3,000,000	3,500,000	3,500,000
Rainwear and outerwear, including sportswear	10,000,000	12,000,000	9,500,000
Aprons, including industrial	1,500,000	3,000,000	3,000,000
Lamination and quilting for other than sportswear	—	8,000,000	11,000,000
Wall covering	—	4,000,000	6,000,000
Industrial tape	—	8,000,000	10,000,000
Inflatables[a]	—	3,000,000	4,000,000
Industrial and miscellaneous	20,000,000	21,000,000	12,700,000
TOTAL[b]	93,400,000	115,000,000	116,000,000[b]

*This table is intended to include only products made of calendered film up to 10 mils in thickness. Everything 10 mils or over is classified as sheeting. However, it is impossible to eliminate a certain amount of overlapping between film and sheeting and between various classifications of products given above. The figures are given as approximations to show trends. Accurate statistics are not available. See page 217 for discussion.
[a]Some 10 million lb. of sheeting, 10 mils or over, were also used for inflatables.
[b]This does not include the film made from imported resin.

industry failed to reach a 600 million-lb. sales figure in 1956, but after a first half year that showed little gain over the same period in 1955, the industry picked up momentum in the second half and went ahead of the same period in 1955. The industry was operating at close to a 600 million-lb. annual rate in the last half, with every indication that it would carry over into 1957 with an increased volume. It seems possible that sales may reach 630 million lb. in 1957. That would be a 75 million-lb. increase or around 13 percent. To reach that volume, the average monthly sales would be 53 million pounds. The average in 1955 was somewhere around 46. The deadly months of June and July brought down the average.

Highlights of the year were the decline in price of basic resin from 31 to 27¢ after a 7¢ decline in 1955, the continued advance of plastisols, the phenomenal increase in sheeting, a good advance in floor coverings, and rapidly rising use of laminates. Except for the laminates, these applications were all well established items that simply grew because the customer wanted more. They should all continue a normal growth, but if the industry depends on these alone for its growth curve, it will never make that billion-lb. mark by 1960.

However, there are other fields now still in infancy that are expected to show tremendous volume increase and can almost surely be counted on to give the vinyl industry a big lift, starting in about 1958, 1959, or 1960. Some of them are: much greater use of laminates; coating resins for a great variety of uses other than fabric or paper; injection molded elastomerics; agricultural uses for film and sheeting; wall coverings; rigid or unplasticized resin for pipe and sheeting; and possibly foam. Wire coating, too, may go even far beyond its present high estate if a higher heat-resistant resin is developed. There are doubtless several other fields that producers are keeping under their hats. In addition, there will be some improved resins to help the cause along since they will broaden the base for applications, but any such development will have little effect on growth before 1960. Researchers are also very busy improving techniques for using presently available resins with smaller amounts of plasticizer or none at all. The industry will benefit from a new line of vinyl products that will have thinner sections but better properties in such categories as heat resistance, strength, aging, or weathering and no migration or exudation. Calendered 1-mil film that is polished in rollers or stretched as it leaves the machine is one possibility—more extruded thin film is another.

Table X: Vinyl chloride for molding and extrusion

Application	1955 lb.	1956 lb.
Phonograph records	25,000,000	24,000,000
Slush and elastomeric molding	31,000,000	40,000,000
Garden hose	13,000,000	9,000,000
Profiles	27,000,000	32,000,000
Wire coating	72,000,000	79,000,000
Rigid pipe	3,000,000	6,000,000
Export and miscellaneous*	12,000,000	8,000,000
TOTAL	183,000,000	198,000,000

*Part of the export figures are reported here, but biggest portion of export business is reported in Table VIII under "Miscellaneous."

Plastisols, as mentioned above, are no longer a new item, but their steady growth over the last few years has been an outstanding feature of the industry's progress and is expected to continue for years to come. Total production is unknown and can't be deduced from the Tariff Commission reports since plastisols are used for many different end products: the total used is buried in the molding, fabric-treating, and coatings classifications. Men who use them estimate the total 1956 poundage of plastisols at from 60 to well over 70 million pounds. A new development that could mean millions more pounds of production is a rigid plastisol or rigidsol which is now hidden behind a curtain that may be raised at any time.

The fastest growing part of the plastisol business was rotational casting which has been coming along rapidly for over two years.

Fabric coating with plastisols didn't grow much in 1956. Calender coating seems to be more economical for heavy upholstery since heavier coats can be applied by that method. However, there will always be a substantial amount of plastisol spread-coated fabric, most of it for lightweight jobs.

Sponge plastisols of the Elastomer or mechanically blown type are just beginning to

find uses after several years of development work. Padding for sun visors on automobiles is probably the largest volume application today. Padding on stools for office furniture is another and some is being tested along with other sponge or foam for transportation cushions. Vinyl sponge automotive seat cushions may be in use in two years' time. They will be easy to fabricate and have a built-in resiliency with no fight-back. They are not flammable, are cooler than rubber, and will be no more costly. Present commercial foams weigh about 7 lb./cu. ft., but 5 lb.-foam (which will bring cost down) is in the laboratory. Some estimators guess that as much as 20 million lb. of vinyl resin, which will make 35 million lb. of foam, will be used in 1960. More optimistic estimators see 60 to 70 million lb. of resin and from 100 to 110 million lb. of foam.

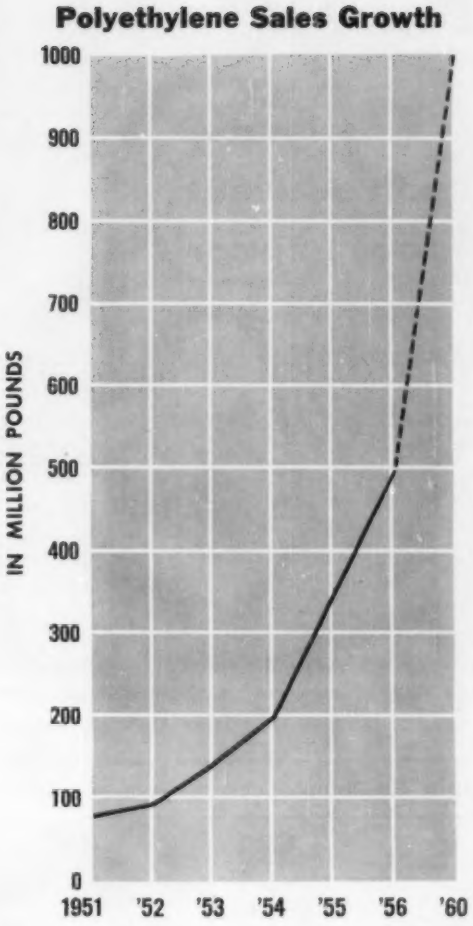
Chemically blown vinyl foam of either open- or closed-cell construction also made development progress in 1956, but application is largely in the flotation field up to now. Growth is expected to start soon in many of the same fields as other flexible foams. Crash padding in particular is a possibility; (*To page* 212)

Polyethylene

We don't know where he's going, but we sure know where he's been, was the reported telegraphed reply of an army post commander to headquarters when they asked the whereabouts of a famous old Indian fighter who was out to clean up a series of uprisings on the Western Plains. The same phrase could be applied to polyethylene today. There's no doubt that its been around in ever-increasing quantity, but almost everyone wonders where it's going.

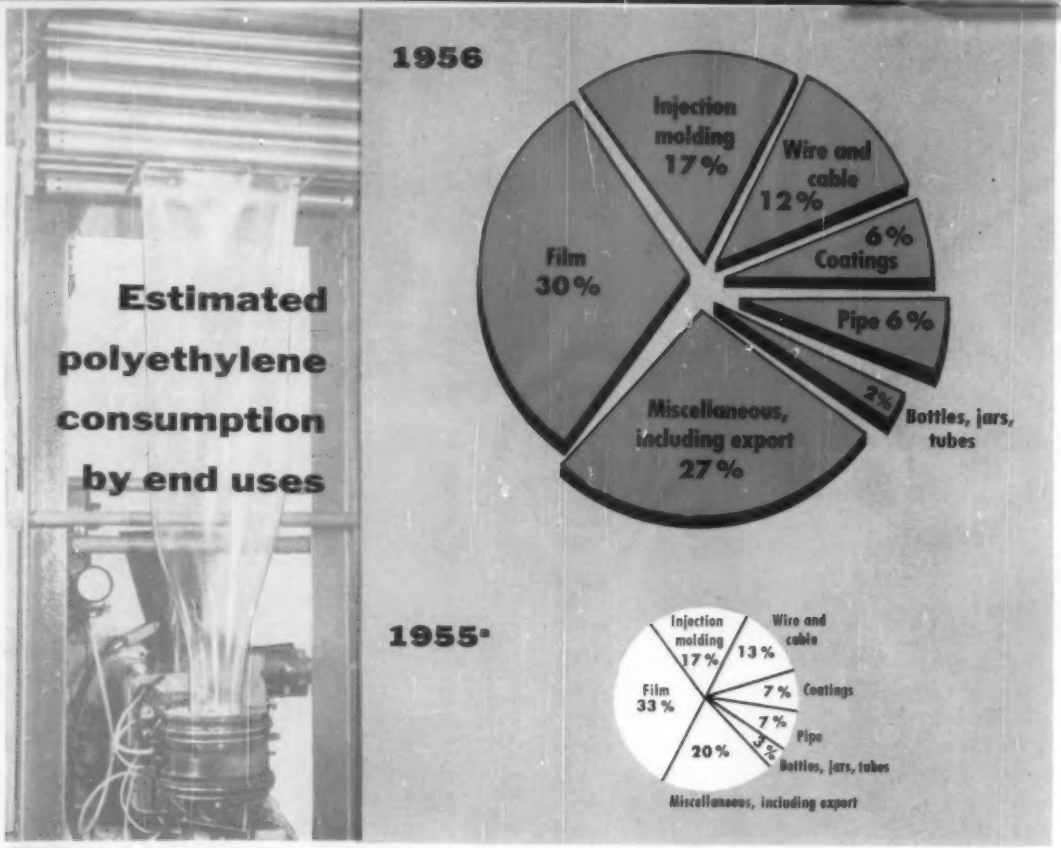
Supply has definitely caught up to demand, as witnessed by the Tariff Commission's monthly reports which show a production surplus over sales of from 3 to 10 million lb. a month. But the sales figure continues to mount —highest available at time of writing was 44.8 million lb. in August and that record will have been broken before the year ended. The industry is now operating at close to a 540 million-lb. sales rate and not far from a 600 million-lb. production rate.

Actual capacity today of the eight high-pressure process producers is thought to be about 650 million lb., but not all of them are prepared



to operate at capacity. This 650 million-lb. figure does not include Allied Chemical's 20 million-lb. plant for low-molecular-weight material, but it does include allowance for production above their 1955 capacity for Du Pont, U.S.I., and Texas-Eastman, as well as about 50 million lb. a year more for Bakelite than announced. In addition, three or four of these eight companies are planning even more capacity for their high-pressure facilities to come in before the end of 1958, which would bring the total high-pressure processed material capacity up to around 800 million pounds.

Furthermore, no one knows what a company like Dow will do. It started small with an avowed intention of getting bigger when more experience was acquired. Allied's production has been omitted from these figures because its low-molecular-weight material has been used largely for waxes, such as for bread wrappers,



[a] Some percentages are probably a point or two higher in 1955 than they should be since part of the export figure was entangled in these various classifications.

Table XI: Estimated consumption of polyethylene, by end uses

End use	*1953*	*1954*	*1955*	*1956*	*1960 (?)*[b]
	lb.	*lb.*	*lb.*	*lb.*	*lb.*
Film and sheeting	45,000,000	70,000,000	115,000,000	150,000,000	330,000,000
Molding	21,000,000	34,000,000	60,000,000	75,000,000	185,000,000
Wire and cable insulation	32,000,000	29,000,000	45,000,000	60,000,000	190,000,000
Pipe[a]	18,000,000	22,000,000	26,000,000	30,000,000	110,000,000
Coatings	15,000,000	20,000,000	30,000,000	35,000,000	90,000,000
Bottles, jars, tubes	6,000,000	7,000,000	9,000,000	12,000,000	45,000,000
Exports	....	12,000,000	65,000,000	140,000,000	?
Miscellaneous	....	13,000,000	[c]	5,000,000	50,000,000
TOTAL	137,000,000	207,000,000	350,000,000	507,000,000	1,000,000,000

[a] This does not include reprocessed material which may have been more than 12 million lb. in 1955 and over 20 million in 1956.
[b] This figure was developed by comparing estimates of three different producers.
[c] The miscellaneous figure for 1955 is difficult to estimate because it is probably divided up between other classifications.

and is not generally suitable for other polyethylene applications; but the company shouldn't be written off the books as a future producer of conventional polyethylene. Another company not yet heard from but thought to be deeply involved is Standard Oil of New Jersey, although its interest may be in low-pressure material.

Low-pressure situation—The low-pressure processed polyethylene situation is not much different than it was a year ago. Koppers is producing a substantial amount—there are some toys, housewares, and rope on the market made from its material—but by and large it is used for development work by various processors

who are waiting until they can be guaranteed a continuous supply in large quantity before putting their products on the market. Koppers' present supply comes from its Kobuta Works. Its 30 million-lb. plant in New Jersey is expected to come on stream late in the first half of 1957 if ethylene is then available. The 60 million-lb. plant in California to be built by Koppers and Brea Chemical is not expected to come on stream until late in 1957 or early 1958.

Hercules Powder Co. is distributing a goodly amount of low-pressure processed polyethylene made by Hoechst of Germany with whom it has a working agreement to provide material and exchange know-how. Hoechst has been working on the low-pressure process longer than anyone. Hoechst presently has the largest low-pressure process plant in operation, even though it is not large compared to American standards, but manages to ship fair quantities to Hercules each month. The Hoechst plant will be on a 25 million-lb. basis some time late in 1957 when its ethylene plant is completed.

The Hercules polyethylene plant is almost ready and, if ethylene is available, should come on stream in the first half of 1957. Hercules should be able to come into production quite rapidly once its plant is equipped and supplies are available since it will have access to Hoechst experience while most other companies will probably have to spend considerable time in fathoming the usual production problems of a beginner. Several products made from the Hercules imported resin, mostly (*To page* 218)

Nylon

Emphasis in the nylon plastics industry in 1956 was more on the future than today, just as it was in methacrylate. Nylon applications continued to grow in variety and volume, but they followed about the same pattern as in other years with possibly more emphasis on larger pieces. Major interest was on new companies entering the field and on a new extrusion formulation that is thought to be exceptionally useful for aerosols as well as other applicatons.

The two new companies which have announced that they will build nylon facilities are

COST TABLE: Plastics for molded containers

Type of material		Base price[1] per lb., $	Specific gravity, molded	Cost per cu. in., cents	Color range	Molding methods[5]
Acrylics	Clear	0.55	1.18	2.36		I
	Colors	0.59	1.18	2.51	Unlimited	
Cellulose acetate	Clear	0.50	1.3	2.35		I
Translucent	Colors	0.46	1.3	2.16	Unlimited	
Opaque	Colors	0.36	1.3	1.69	Good	
Butyrate	Clear	0.62	1.28	2.87		I
	Colors	0.62	1.28	2.87	Good	
Ethyl cellulose	Colors	0.72	1.15	2.99	Good[4]	I
Melamine[2]	Colors	0.45	1.50	2.44	Good[4]	C
Phenolics[2]	Brn. or blk.	0.205	1.36	1.00	Limited	C
Polyethylene	Natural	0.41[3]	0.92	1.38[3]		I
	Colors	0.505		1.68	Limited	
Polystyrene[2]	Clear	0.305	1.05	1.16		I
	Colors	0.335	1.06	1.25	Unlimited	
Modified styrene	Natural	0.33	1.07	1.29		I
	Colors	0.36	1.07	1.37	Good[4]	
Ureas	Colors	0.33	1.50	1.79	Good[4]	C

[1] The prices given here are those prevailing at the time this table was prepared. Current prices should be obtained for purposes of actual comparison.
[2] General-purpose grade.
[3] At time of preparation, a discount of 5% reportedly was in effect, making the price of natural polyethylene approximately $0.39 per pound and the cost per cubic inch, 1.30 cents.
[4] In solid colors. [5] I—Injection molded. C—Compression molded.
Courtesy Modern Packaging Encyclopedia Issue—1957.

COST TABLE: Papers—Films—Foils

MATERIAL[1]	Cost per lb.	Yield, sq. in. per lb.	Cost per 1,000 sq. in.
Glassine			
Bleached, 25 lb.[2]	$0.23	17,280	$0.013
Lacquer coated, moisture-proof, heat sealing, 28 lb.[2]	0.43	15,428	0.028
Laminated, bleached, 47 lb.[2]	0.29	9,191	0.032
Waxed paper			
Bread-wrapper grade, 39 lb.	0.22	11,080	0.020
Liner grade, moistureproof, amber, 31 lb.	0.22	13,935	0.016
Cellophane			
Moistureproof, heat sealing			
(300 MS)	0.59	19,500	0.030
(300 MS 51 or MS-1 type)	0.59	21,000	0.028
Moistureproof, water resistant (300 MSA or MSB)	0.66	19,500	0.034
Cellulose acetate			
Cast (1 mil)	0.85	22,000	0.039
Extruded (1 mil)	0.71	22,000	0.032
"Mylar" polyester film			
(1 mil)[3]	2.25	20,000	0.112
Polyethylene (1.5 mil)[4]	0.55	20,000	0.028
Pliofilm (1 mil)	1.10	24,000	0.046
Saran (1 mil)			
Vinyl			
Cast (1 mil)	0.87	21,600	0.040
Extruded (1 mil)	0.87[5]	21,500	0.040
Foil-acetate			
(1 mil[6]-1 mil)	1.42	6,490	0.220
Foil label stock			
(0.00035[6]-29 lb.)	0.44	9,195	0.048
Aluminum foil[7]			
Thickness, inches			
0.00035	0.81	29,200	0.028
0.0005	0.77	20,500	0.038
0.0007	0.73	14,600	0.050
0.001	0.68	10,250	0.066

* This comparison of approximate costs is intended only as a guide. The figures given were obtained from 1956 price lists and are based on "volume" orders varying from 500 to 1,000 or more pounds, depending on the material involved. The reader must bear in mind that costs are influenced by many factors, including variations in grade, gauge, specific treatments, volume orders, market fluctuations, etc.
[1] Standard commercial grades, unprinted.
[2] Based on a ream of 500 sheets, 24 by 36 in., or 3,000 sq. ft.
[3] A thickness of only ½ mil is said to be a typical gauge for packaging applications. Cost of ½-mil Mylar is $2.75 per pound. Yield is 40,000 sq. in. per pound and cost per 1,000 sq. in. is $0.068.
[4] Standard thickness of polyethylene film used in packaging is 1.5 mils. For purposes of comparison, 1-mil polyethylene sells for 56 cents per pound. Yield is 30,000 sq. in. per pound and cost per 1,000 sq. in. is $0.19.
[5] One producer offers a grade of extruded vinyl priced at 80 cents per pound and cost per 1,000 sq. in. is $0.034.
[6] Aluminum foil.
[7] Unsupported.
Courtesy Modern Packaging Encyclopedia Issue—1957.

Spencer Chemical Co. and Foster Grant Co., Inc. Both say they will produce a caprolactam-type nylon similar to Perlon and Akulon produced in Europe. Neither plant is expected to be ready for business before 1958 and both companies state that production will start on a limited schedule—perhaps a million pounds or so a year. Allied Chemical, which recently came into the business and is the only producer of caprolactam monomer in the United States, will supposedly supply the raw material.

Nylon-6, or the type derived from caprolactam, is somewhat different from nylon-6/6, the Du Pont variety. It is somewhat "softer" and may therefore be somewhat more applicable in certain applications where "squeeze" is desirable such as in faucet washers. Producers also assert it is more applicable for large moldings because it is less likely to present void troubles. However, the new producers are more concerned over its possibilities as an extrusion material for film, sheet, pipe, and similar uses. This is a field only partially explored but is expected to develop into reasonably large volume over a 5- or 10-year period. It is also logical to assume that Foster Grant is interested in its use as a material for bottles since the company has a large-scale polyethylene bottle operation under way.

Nylon-6 has been widely used in Europe for some years for the same type molding operations as in the United States, but again it is pertinent to point out that the economics of molding in Europe and the United States are quite different.

Future price competition between nylon-6 and nylon-6/6 is a moot question. They are competitive in England where I.C.I. has had to meet competition from continental sources and are both listed at the same prices in the United States. Caprolactam is claimed to be made from lower cost raw materials than nylon-6, but the latter is now produced in an amortized plant and is thus in an amortized position.

The plastics industry is expectantly awaiting the day when nylon prices are around $1 a lb. in the United States but may have to wait until competition becomes more vigorous. In Europe that day has already arrived, but to repeat once more, European and American economics simply are not comparable.

Included in the expansion plans for nylon was Du Pont's announcement of a new multi-million pound addition which started last October, and increased facilities to come in during 1957. A large part of this (*To page* 226)

New directions for plastics applications

A review of some of the developments of 1956 which stand out as milestones in plastics' progress

Underlying the movement of plastics materials into new areas of application in 1956 were two basic factors:

1) Downward price trends in plastics resins during the year, when prices of other materials were rising, placed plastics in an even better competitive position. (See MPL, March 1956, p. 5 and p. 256.)

2) Sociological influences in 1956, particularly the rise in national income, the increase in leisure time, the move to suburbia, and the generally increased pace of living, translated new ways of life into broader potential market areas for plastics. (See MPL, June 1956, p. 150.)

Assisting both underlying factors, of course, were the strides made during the year in improving plastics materials and in refining fabricating techniques to meet the new demands. From the standpoint of materials development, the year 1956 stands out as one of the most active periods in the industry's history (see p. 85); similarly, improvements in plastics processing, particularly in adapting the principles of automation to high-speed mass-production of plastics products, keynoted application advances in 1956 (see p. 129).



Luggage field found many uses for molded handles, frames, trays, etc. in 1956. (Photo, Eastman Chemical)

Luggage

(See text, page 108)

Even bigger potential is inherent in new luggage construction based on formed sheeting. (Photo, Regal)



Threshold to the future

Plastics applications moved forward along a broad and fluid front. As had been expected, most substantial gains were made in many of the fields in which plastics already had a secure foothold. In the automotive industry alone, for example, it was conservatively estimated that 1956 plastics consumption jumped during the year to a figure of about 15 lb. per car.

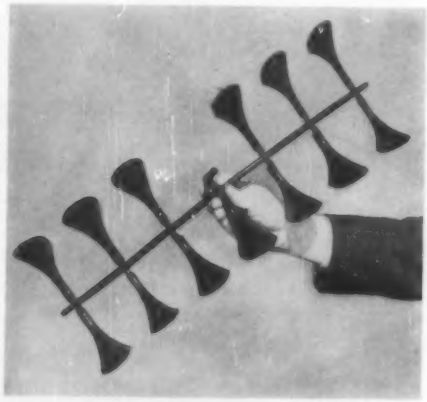
But what really made 1956 stand out as a *distinctive* year for plastics applications were

Footwear

(See text, page 109)



Ladies' shoe heels molded of butyrate and decorated with rhinestones played prominent role in the '56 fashion picture



Cost savings effected by molding heels in quantity adds element of economy to styling features, thereby insuring future footwear markets. (Photos, Eastman Chemical Co.)

the significant inroads made into new fields and, even more important, the new directions in which plastics began to move in each of these fields. For example: in the $200 million luggage field the successful introduction in 1956 of suitcases based on formed styrene copolymer sheet construction opened to plastics new avenues of application in the heretofore unexploited area of "hard-side" luggage. Similarly, by the end of 1956, the $3½ billion footwear industry was gearing up for the possibility that all-plastics heels would be joining extruded welting, molded counters and midsoles, and similar plastics applications as accepted standard plastics components in modern shoe design. A comparable pattern of growth during the year was evident in such other industries as transportation, housewares, lighting, agriculture, packaging, building construction, and refrigeration. Together with luggage and footwear, it will be these industries that will be surveyed in this review as indicative of the *new directions* that plastics applications took.

Luggage

The strides made by plastics materials in the design of new types of molded or formed luggage in 1956 are all the more remarkable in view of the fact that the basic concept of conventional luggage construction—fabric or leather stretched over a frame—dates back to ancient Egyptian times. Leaders in the luggage industry are now convinced that their future lies in completely new types of construction based on plastics materials.

Until a few years ago, plastics' contributions to the luggage industry were in such subsidiary roles as plastic-coated fabrics adhered to wooden boxes, unsupported vinyl sheeting stretched over a frame, flexible garment bags fabricated of sheet materials, extruded weltings and bindings, and molded handles, mirror frames, and other accessory equipment—applications which still serve an important function in the industry today. (See MPL, Oct. 1956, p. 133.) Several years back, however, the introduction of molded reinforced plastic luggage, followed by a new line in which embossed vinyl sheeting was bonded to a contour shell molded of resin-impregnated cellulose fiber-fibrous glass, focused attention on the completely new concept of lightweight luggage shells formed in one piece under heat and pressure.

In 1956, three manufacturers offered further refinements by announcing new lines of lug-

gage, portfolios, and brief cases with shells formed entirely of styrene copolymer sheeting or made up of the sheeting molded over a resin-cellulose fiber contour core. (See MPL, Nov. 1956, p. 126.) One of these manufacturers has gone so far as to predict that, within 10 years, some 90% of ladies' luggage and between 30 to 35% of men's luggage will be based on plastics constructions.

Footwear

In that phase of the booming footwear industry concerned with the design and construction of heels for women's shoes, the impact of plastics materials was so great in 1956 that one manufacturer was prompted to remark that "the wood heel industry now recognizes that its very salvation depends upon conversion to plastics heels." Originally, fashion dictates calling for pencil-thin heels had been behind the switch from wood to molded or fabricated plastic heels which would be strong enough to withstand walking stresses without snapping. (See MPL, April 1956, p. 99.) By the end of 1956, however, the many physical advantages of plastics and the economy implied in injection molding heels in quantity had become so apparent that plastics materials, including acrylic, acetate, butyrate, and, in one case, even nylon, were being considered as prime materials of construction for ladies' heels of all types.

At the same time, the emphasis on plastics heels focused the industry's attention on the possibility of adapting plastics to other components of shoe construction. Polyethylene, already familiar to the industry in molded shoe counters, cropped up in a molded heel base for men's, children's, and some women's shoes, and in molded sandals and clogs for beachwear or playtime use. Vinyl found outlet in the shoe field in the form of insoles consisting of a layer of porous vinyl laminated to a latex-impregnated backing. (See MPL, April 1956, p. 221.) Clear vinyl sheeting, fitting nicely into the current fashion requirement for transparent evening shoes for women, also increased its stake in the footwear field. And foamed plastics of all types are heralded as the answer to many of the industry's problems. Sandals padded with polyurethane foam are already on the market; one manufacturer claims to have developed a tough vinyl foam that would be suitable for soles; another is experimenting with foamed plastics as a shoe lining.

Nearly 600 million pairs of shoes will be sold



Jet transport points up new concept of aircraft interior design based on removable "panel-type" plastics parts. (Photo, Boeing)



Automotive design in 1956 emphasized "safety" advantages of foamed plastics and resilient plastic sheeting. (Photo, Ford)

Transportation

(See text, page 110)

Lightweight, low-silhouette trains also stood out as markets for plastics seating, flooring, lighting, insulation, etc. (Photo, Budd)



in 1956; predictions are that by 1966 the figure will reach 850 million pairs. No wonder, then, that the success of these applications has sent the many members of the plastics industry scurrying for a larger share of the lucrative market. More developments can certainly be expected.

Transportation

Awareness of plastics both as an engineering material and as a decorative material was more evident in the construction of transportation facilities in 1956 than ever before.

In the automotive field, for example, while total car production dropped from the record 8 million figure of 1955 to about 7 million units, the poundage of plastics per car continued to grow. Chrysler alone used some 250 components made wholly or in part of plastics in one of its typical '56 models.

Most of this poundage, of course, was accounted for by such accepted uses as acrylic lenses, vinyl upholstery, butyrate steering wheels, phenolic insulation and connectors, etc. However, it was the many 1956 innovations involving the newer plastics materials that created the most interest as possible bases on which to build automotive applications of the future. (See MPL, March 1956, p. 89; April 1956, p. 114.) Nylon, for one, found an increased demand in molded gears and bushings; Mylar polyester film rose in prominence as a decorative material for interior trim; the emphasis on safety in the '56 cars pushed foamed vinyls and polyurethanes and formed styrene copolymer sheeting to the forefront; and the use of polyethylene film as a door water shield opened whole new avenues of possibilities.

Refinements in the techniques of molding polyester-glass or polyester-sisal premixes or molding compounds into heater housings and air conditioning housings also enabled the industry to take advantage of more plastics materials. (See MPL, Aug. 1956, p. 91.) Body parts molded of these compounds and premixes seem the next logical step. One manufacturer has already successfully introduced a complete car door inner liner molded of polyester-glass premix material.

Trucks and trailers—In the construction of the 1956 model trucks and trailers, lightweight reinforced plastics bodies played an increasingly important role. (See MPL, Nov. 1956, p. 103.) With the population shifting out to the



Molded baby baths were one of the "king-size" housewares that accounted for 30 million lb. of polyethylene in 1956. (Photo, Loma)

Housewares
(See text, page 112)



Disposable styrene cups for coffee vending machines may presage complete lines of disposable tableware. (Photo, Crown Machine)

suburbs and with so many highway improvement projects underway, truckers indicate that the anticipated record production of trucks and trailers would mean a bigger market for the specialized properties of the plastics bodies—light weight, ease of maintenance, translucency for daylight loading, and insulation. As far as the latter advantage is concerned, designers of refrigerated truck trailers seemed especially excited about the use of sandwich materials incorporating an integral insulating foamed plastics core.

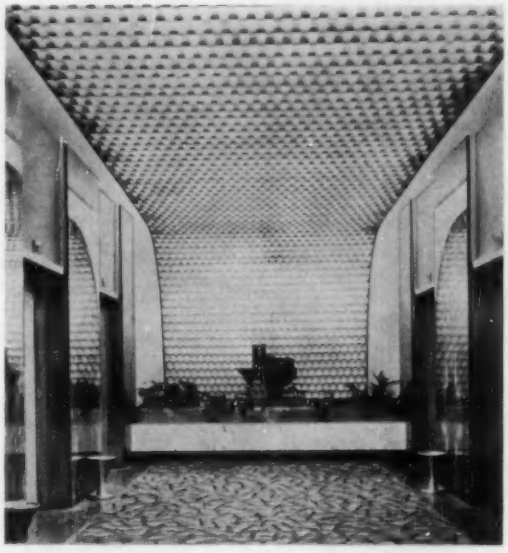
Railroads and airplanes—But from the standpoint of *new* applications and *new* markets, both automobiles and trucks had to take a back seat to developments in the railroad and airplane industries. In 1956, both of these industries really opened up as large-volume potential markets for plastics materials. Especially significant for the railroad industry were the new lightweight, low-silhouette trains. All of these trains make extensive use of plastics in interior design to cut down on weight and, more important, to reduce steadily mounting maintenance costs. One train manufacturer based much of the interior design on the use of reinforced plastics components, ranging from seat shells to a molded one-piece lavatory. (See MPL, Sept. 1956, p. 110.) Another included interior furnishings of vinyl tile, vinyl-to-metal laminate wall panels, acrylic light diffusers, and foamed isocyanate insulation. (See MPL, June 1956, p. 166.)

In the aircraft industry, it was an application in commercial jet aircraft of the future that stole the plastics spotlight. One manufacturer reported on a jet plane that would incorporate formed styrene copolymer sheet and vinyl-to-metal laminate wall panels and hat racks, vinyl-to-fibrous glass ceiling panels, Mylar polyester film shades, foamed polyurethane rug underlay, acrylic light diffusers, and molded nylon window frames.

As with train interior design, most of the plastics applications in the jet aircraft were based on a new design theory known as "flexible standardization"—a theory that seems certain of securing for plastics a major share of the railroad and aircraft market for some time to come. As explained by a leading interior designer, flexible standardization applies to the use of pieces or panels formed or molded of plastics in standard shapes, making it possible to remove individual sections and replace them as often as desired. Thus, when the interior of a plane wall section, for example, needs repair-

Lighting

(See text, page 113)



Decorative effects, such as this basket-weave pattern, help boost sales of acrylic luminous ceilings. (Photo, Rohm & Haas)



Modern fluorescent fixture design finds increasing use for vacuum formed plastic diffusing pans as a replacement for egg-crate louvers and side panels. (Photo, Sheffield)



More than 1 million ft. of elastomeric vinyl tubing for portable irrigation ditches are already in use. (Photo, Trinity Products)

Agriculture
(See text, page 115)



Easy-to-build greenhouse for home gardeners is as lush a market for polyethylene film as commercial greenhouses. (Photo, Bakelite)

ing, the individual formed plastic wall panel is simply removed and replaced with a new one. Previous "static" interior design made it necessary to rip up a large segment of the wall to get at the damaged part.

Mention should also be made of the fact that glass-reinforced polyester boats were being turned out in 1956 at the fabulous rate of about 40,000 a year. With the advances being made both in improved resin formulation and in the use of overlay veils and with continuous refinements in production techniques (see MPL, March 1956, p. 104), the volume should be even greater in 1957.

Housewares

Plastics applications in the housewares field in 1956 can only be described by the oft-quoted phrase, "bigger, better, more economical, and more colorful than ever before." A general upgrading in quality was noticeable all along the line, in a diverse range of products involving a wide variety of plastics materials.

Several prominent trends can be singled out of the year's activities, however, to indicate why housewares manufacturers are convinced that 1957 will be at least as good a market for plastics as 1956.

1) Where plastics housewares most merited the label of "bigger than ever before" was in the design of the new king-size polyethylene moldings—buckets, garbage pails, trash containers, dish pans, baby baths, and laundry baskets. From the 9 million lb. of material used for such items in 1954 and the 26 million lb. used in 1955, it was estimated that the volume of polyethylene used for the king-size applications in 1956 was close to 30 million lb.—and so successfully were the products marketed that forecasts indicated that in 1957 more than half of the polyethylene being used for housewares would go into pieces weighing from 3 to 12 lb. each. (See MPL, Oct. 1956, p. 123.)

2) Credit for being able to label 1956 plastics housewares as "better than ever before" belongs to the strides made by the industry in sound design based on properly selected plastics materials. The newer plastics, in particular, with their greater rigidity and strength were being used to such an extent that a survey on plastics housewares conducted by Du Pont showed that 63% of the housewives interviewed preferred using plastics in kitchen items because they "did not break easily." Polyethylene for housewares of all types was

Packaging

(See text, page 227)



Boilable polyester film bag for frozen foods highlighted "heat-and-eat" packaging trend in 1956. (Photo, Standard Packaging)



Colorful molded styrene containers continue to prove their ability to add new merchandising appeal to even such stand-by dairy products as cottage cheese. (Photo, Dow)

probably used at the rate of 100 million lb. a year in 1956; the high-impact styrenes also increased in poundage for kitchenware; and nylon started to show up in such applications as basters and mixers. (See MPL, April 1956, p. 107.)

3) The concept of low-cost disposables was a new element of economy introduced into the housewares market in 1956. First indication of the possibilities inherent in the concept was the introduction of a line of injection molded styrene cups for vending machines that sold for only a few pennies more than standard paper picnic cups. (See MPL, June 1956, p. 177.) With the further appearance during the year of low-cost disposable restaurant dishes formed of plastics sheeting, housewares manufacturers began to foresee the possibility of a complete line of disposable tableware that would be ideal for picnics, beach use, and as spares in the home. (See MPL, April 1956, p. 5.)

4) New decorating techniques developed to complement the almost infinite varieties of color in which most plastics materials are available helped make '56 plastics housewares "more colorful than ever before."

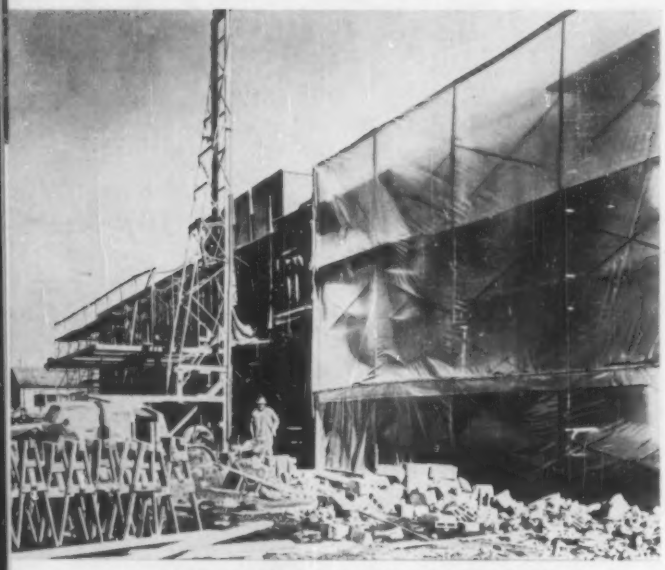
One such technique developed in 1956 was a method for decorating styrene sheet by laminating a reverse-printed transparent overlay to the face of the sheet and then vacuum forming the sheet into containers, basins, trays, etc. (See MPL, Sept. 1956, p. 97.) Other manufacturers were experimenting with the idea of forming housewares articles, such as candy dishes, from sheets of vinyl laminates with leaves, grass, etc., used as the decorative filler. In melamine tableware, decorative effects based on the use of a printed paper foil molded into the face of the dish won new converts. One molder of melamine tableware also introduced a two-tone dish in which the rim is molded in a contrasting color and still another molder introduced a line of tableware with the translucent qualities previously associated only with fine porcelain.

Lighting

Indicative of the strong interest centered on lighting applications in 1956 were the large number of improved plastics materials that appeared, designed specifically to meet lighting requirements. Improved formulations in impact-resistant, light-stable, or heat-stable vinyls, acrylics, or styrenes were offered by nearly every major materials supplier. Just one of the

Building Construction

(See text, page 229)



Big outlet for polyethylene film in building is in protective coverings over scaffolding during construction. (Photo, Visking)



Durable extruded vinyl window frames are another milestone in the progress toward the "all-plastics" home. (Photo, Goodrich)

leading lighting houses, doing a $10-million-a-year business, reported in 1956 that plastics, in the form of luminous ceilings and individual diffusers for fluorescent lights, accounted for close to 75% of this business.

In 1956, as in 1955, individual diffusers still ranked over luminous ceilings as a market for plastics. In this respect, a noticeable trend during the year in modern fluorescent fixture design for institutional and commercial installation was toward the replacement of conventional egg-crate louvers and side panels with vacuum formed plastics pans. Consequently, most of the improved plastics were in the form of sheeting materials aimed at this market. One extruder even claimed to have developed a styrene sheet incorporating a special ultra-violet light absorbing material that was reported to have six times the light stability of conventional styrene sheet.

To meet the competition of formed pans, the manufacturers of molded diffusers turned their attention to designing enclosures with molded-in prisms that would improve lighting control. One such application in 1956 was a precision molded acrylic enclosure with a series of prismatic cones and parallel refracting prisms designed to give light control in all directions while providing a high level of downward light. (See MPL, Aug. 1956, p. 192.) Another new type of enclosure introduced in 1956 was made up of a frosty, flat vinyl top panel electronically fused to a molded vinyl cellular bottom panel. With this construction, direct glare is controlled by the bottom louver section while reflected glare is reduced by the frosted top panel.

Luminous ceilings—In the field of luminous ceilings, a good deal of activity centered on the development of "packaged units" which could be specified by the architect and easily obtained and installed by the builder. A typical "package" of this type was designed to simplify installation and maintenance of corrugated vinyl luminous ceilings by combining support frame and light source in one pre-wired and pre-assembled unit.

The ability of plastic sheeting to be formed and joined into interesting configurations was also used to advantage in 1956 in highly decorative types of luminous ceilings. In one such application for a hotel lobby, strips of ⅛ in. translucent white acrylic were preformed and woven around brass bars to effect an interesting basket-weave.

For residential lighting, lamp shades fabricated of plastics materials continued to play a

prominent part. Vinyl and styrene sheeting vacuum formed into the "bubble" shapes and other unusual contours which make up modern interior decoration were particularly outstanding. (See MPL, April 1956, p. 108.) One manufacturer also created considerable excitement with a new type of shade material consisting of a woven fibrous glass fabric fused to a styrene alloy sheet backing. The woven glass imparts a hand-loomed appearance to the shade while the prismatic qualities of the backing provide effective diffusion of the light passing through the shade.

Agriculture

The agricultural field emerged in 1956 as an important market for plastics materials, particularly for polyethylene and vinyl film. It was estimated that about 200,000 to 300,000 lb. of polyethylene and vinyl resins went into the production of film for agricultural purposes during 1956—and predictions were that the figure might hit 100 million lb. in less than 10 years. (See MPL, Sept. 1956, p. 112.)

Largest use for the polyethylene film is expected to be in the form of a mulch for fruits and vegetables. The tough, water-resistant film used for this purpose keeps the soil around the plants soft and moist for better growing conditions, curtails weed growth, and protects the produce from rotting.

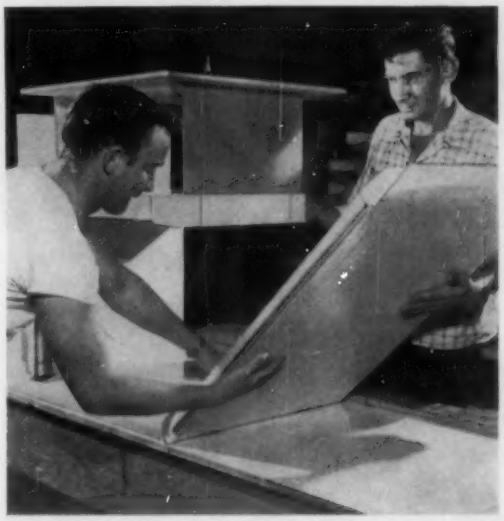
Another aspect of the developing agricultural trend is the use of vinyl or polyethylene film as a lining for irrigation ditches and farm ponds to cut down on the water lost because of seepage. Along the same lines, one manufacturer has developed a flexible vinyl irrigation tube which can be easily assembled in the field and which can be rolled up for storage. (See MPL, Nov. 1956, p. 110.) Over 1 million ft. of this tubing are already in use and sales are continuing to expand at an increasingly rapid rate.

Commercial greenhouses made with polyethylene film stretched over a simple wooden frame represent probably the third largest area for plastics usage in the agricultural field. Initial cost of such a greenhouse can be as little as 1/30 the cost of a conventional glass-sided structure and replacement of film is no more expensive than the maintenance costs on a conventional greenhouse.

Other potential applications for plastic film include: large tubes fabricated of film which make excellent temporary (*To page* 227)



Strength, light weight, and economy mark the adaptation of plastics sandwich materials to design of new type of built-in refrigerator



To produce refrigerator, sandwich panel is folded up like a carton—a revolutionary manufacturing idea. (Photos, Westinghouse)

Refrigerators

(See text, page 230)



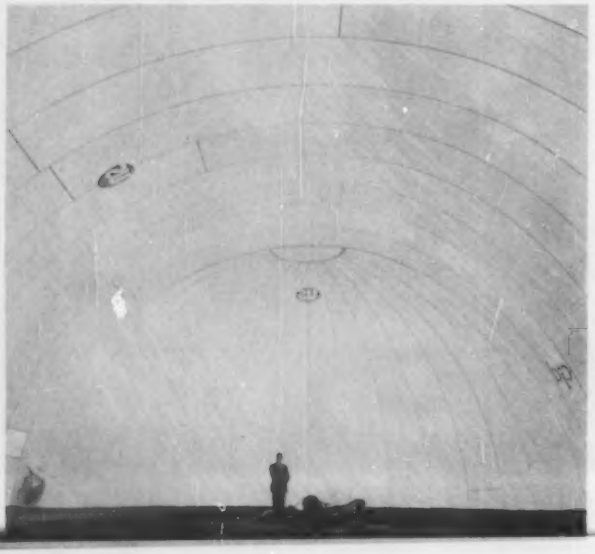
Portable building, when not in use, can be folded into a 3- by 5-ft. package; it takes three men one hour to erect it completely





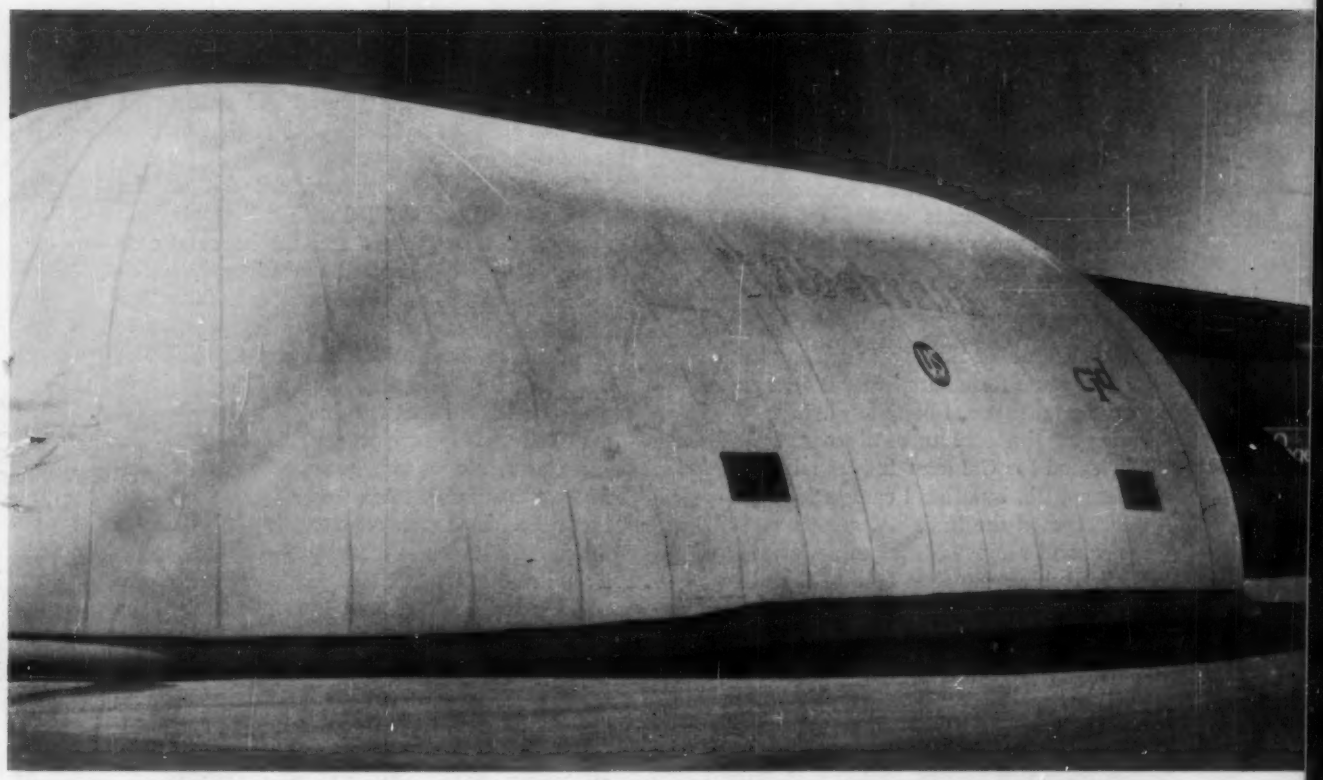
Base tube is filled with water. In locations where use of water is not feasible, sand can be substituted as ballast material. Blower at right inflates the structure. (Photos, U. S. Rubber Co.)

Vinyl-coated nylon material lets enough sunlight through to permit storage activities without need for artificial illumination



Collapsible warehouse

Fabricated of lightweight vinyl-coated nylon, "inflatable" structure is easily erected, dismantled, and transported from site to site



All-weather storage building, supported entirely by low-pressure air, is fabricated of vinyl-coated nylon. Tube running along bottom, made of same material, holds 23,000 lb. of water, anchors building

Portable structures fabricated of Fiberthin vinyl-coated nylon fabric and held up entirely by low-pressure air may be the answer to the long-standing quest of the distribution industry for a low-cost temporary warehouse that can be rapidly erected or dismantled and moved easily from one place to another.

Developed by U. S. Rubber Co. as an outgrowth of work on pneumatic radar shelters, these Airhouses can be put up at an approximate cost of $1/sq. ft., compared to about $3/sq. ft. for prefabricated metal buildings. They can be folded into compact packages for convenient transportation to other sites (for example, the building illustrated on these pages, measuring 80 ft. long, 40 ft. wide, and 20 ft. high, can be reduced to a 5- by 3-ft. bundle), and they provide protection in almost any weather.

Who will use?

The potential market for these structures is vast. While U. S. Rubber spokesmen will not commit themselves to any definite figures, the list of prospective end users hints at an impressive future.

Foremost among them are food manufacturers, who require seasonal storage for package goods during peak production months. Then there are farmers, who frequently need temporary silo facilities. And, finally, there are a host of industrial firms that must have short-term storage space for such products as machine tools, cement, chemicals, lumber, rubber goods, hardware, building supplies, paper, etc. All these can be readily stored in Airhouses. In addition, tests have indicated that they may also be suitable for temporary human shelter; and an enterprising Chicago businessman has recently made one into the first portable store, the Port-A-Mart, 108 ft. long, 50 ft. wide, and 30 ft. high.

In the past, temporary storage facilities were generally available only through high-rental spaces or through uneconomical temporary use of permanent buildings.

Fiberthin is a special weave of nylon fabric

coated with vinyl. It is made in 8- and 12-oz./sq. yd. total weights. Thickness of the 8-oz. material (of which the house shown in the accompanying photos is made) is roughly 10 mils. Fiberthin, in addition to its light weight, is claimed to have good resistance to sunlight and weathering, flame, scuffing, cracking, oils, gasoline, most acids and alkalies, and salt water. It is produced in rolls 50 in. wide, with an average of 50 yd. per roll.

Local fabrication

Fabrication of Airhouses is handled locally by canvas fabricators; distribution arrangements on a regional basis are being set up. For example, the structure illustrated here was fabricated for Calumet Industrial District Co., Chicago, Ill., by a local canvas fabricator. CID then erected the building, guaranteed maintenance, and removed it when no longer needed. U. S. Rubber supplies technical assistance to fabricator and distributor wherever it may be required.

First step in erecting an Airhouse is the production of a pattern which is used to cut panels of Fiberthin material from the roll. The panels are next sewn together to form the walls and roof of the dome-like building. A tube fabricated of 12-oz. Fiberthin is sewn around the bottom of the house. Diameter of the tube varies with the size of the building; for the one shown here it is 18 inches. The tube is later filled with ballast material (generally water, sometimes sand) and functions to anchor the building firmly to the ground. All stitching is covered with a vinyl seam sealant that assures watertightness.

With the building spread out flat on the ground and the tube filled with ballast, air from a compressor is injected into the house at controlled pressure. This pressure bulges the building upward and outward until it is fully "inflated." The compressor continues operating to keep the walls and roof taut and the building erect. Three-quarters p.s.i. above atmospheric pressure is sufficient for this purpose. No solid metal or wooden supports are required.

As air continues to be pumped into the building, air from the inside leaks out underneath the tube, so that a constant low pressure is maintained in the structure. Sufficient air is introduced at all times to permit entry and exit of personnel and vehicles without effect on the stability of the building.

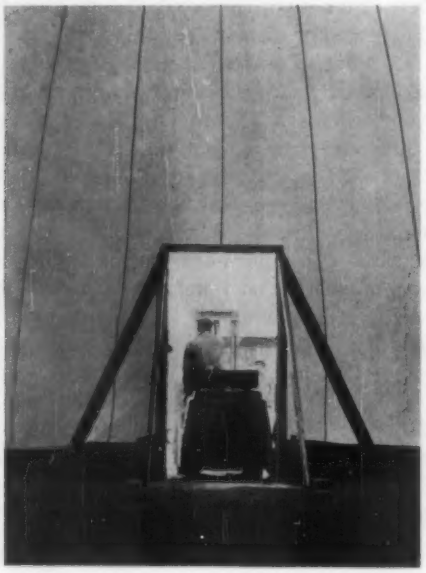
The color and thinness of the material allows sufficient sunlight to reach the interior so that storage activities can proceed without need for artificial lighting.

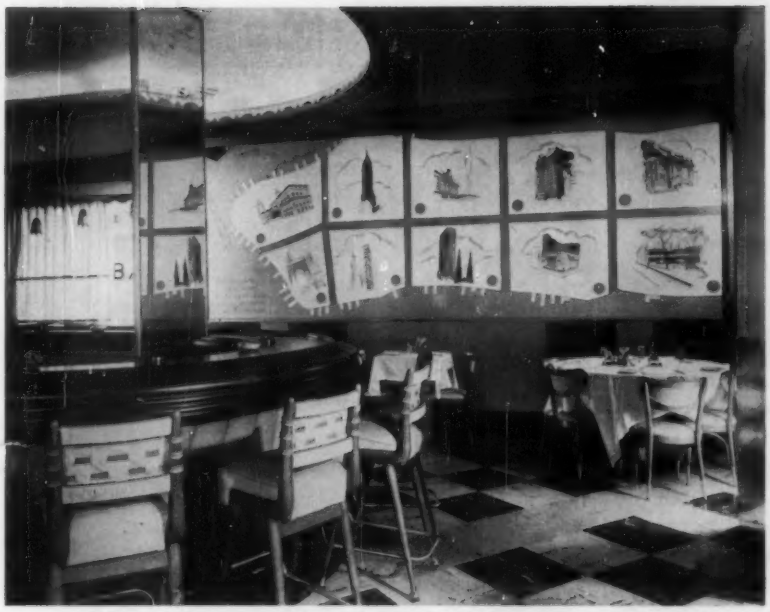
Credit: Fiberthin produced by Coated Fabrics Dept., Footwear and General Products Div., U. S. Rubber Co., at the Mishawaka, Ind., and Staughton, Wis., plants.



Weights of man at top and of ladder at the side do not disturb the stability of the air-supported warehouse building

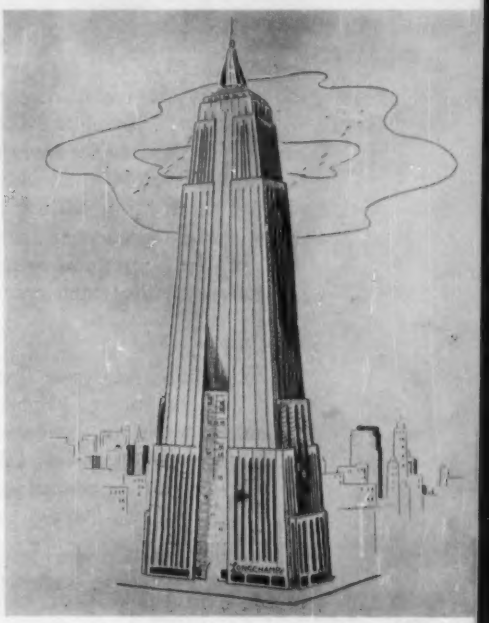
Door can be opened for entry and egress of fork lift trucks without affecting rigidity of structure





Decorative surfacing on restaurant wall is produced by intaglio-carving a laminate consisting of a charcoal-colored core and an ivory-colored melamine overlay. (Photos, Chairmasters)

Close-up of engraving. Design is produced by means of high-speed drill which routs out predetermined portions of melamine overlay, exposing the dark core



Intaglio-carved laminates

Out of years of development work on high pressure laminate "engraving stock" used for instrument panels, name plates, and machine instruction plates has come a new approach to the field of decorative laminates which promises to open up a new market for special effects. A development of Chairmasters Inc., the new intaglio-carved laminates have been installed as decorative wall surfacing in the Longchamps restaurant at 42nd St. and Lexington Ave., New York.

The sheet stock with a charcoal-colored core and an ivory melamine overlay is literally carved with high speed drills to produce an effect somewhat similar to steel engravings but in three dimensions so that when light falls on a panel the depth of the engraving enhances the optical effect, particularly in perspective architectural scenes.

The installation in the Longchamps restaurant involves one-of-a-kind intaglio engravings of such famous New York landmarks as the United Nations Building, The Empire State Building, Chrysler Building, The Cloisters, Washington Square Arch, and The Museum of Modern Art. Since the base intaglio engraving stock, produced by Parkwood Laminates, Inc., Wakefield, Mass., is a melamine-paper laminate, the panels are practically indestructible, may be easily washed, and are completely resistant to any detrimental effects of humidity and ultraviolet light.



INDIA: trend toward self-sufficiency

*By A. H. Srikanta Aiyar, B.Sc.**

The plastics industry in India is largely a post-World War II development. Although the industry is now small, prospects are bright for sizable growth during the coming years. India's Five Year Economic Development Plan has forecast a tenfold increase in production of plastics during that period. This is the highest proportionate increase among all industries dealt with under this plan that envisions a substantial economic expansion.

Raw materials

The Indian plastics industry is largely dependent upon foreign imports for its synthetic resins and molding powders. Recognizing this fact, the government has taken the necessary steps to encourage manufacture of raw materials in the near future. Several projects for the manufacture of synthetic resins are already under way.

In order to assist the industry in making production plans, a Planning Commission has estimated consumption of plastics materials in 1960 as shown in Table I, opposite.

Phenol formaldehyde is the only synthetic resin presently manufactured in India. Capacity of three domestic producers is about 2,200,000 lb./year. Production of phenol formaldehyde during the 1950-56 period is shown in Table II, opposite.

A polystyrene plant is being constructed by Polychem, Ltd., Bombay, in collaboration with The Dow Chemical Co., U.S.A. The plant, with an estimated capacity of 6,000,000 lb./year, will be completed shortly. Initial production will be based on imported styrene monomer. It is expected that when demand for styrene reaches 9,000,000 lb./year, manufacture of the styrene monomer will be undertaken.

Two projects are under way for the manufacture of polyethylene resin. Imperial Chemicals Industries (India) Private Ltd. is planning to construct a polyethylene plant which will have a capacity of 7,000,000 lb./year. National Carbon Co. (India) Ltd. plans construction of a polyethylene plant which will have a capacity of 3,200,000 lb./year.

Two firms are preparing to manufacture urea formaldehyde molding powder: Rattanchand Harjasrai (Plastics) Private Ltd. and Indian Plastics Ltd. Both plants are expected to be in operation by 1958.

Manufacture of cellulose acetate molding powder and polyvinyl chloride molding compounds from imported acetate flakes and imported polyvinyl chloride resin will be undertaken in the near future by East Anglia Plastics (India) Ltd. in Calcutta. No acetate flake is

*Secretary, All India Plastics Manufacturers' Association, Bombay.

The accompanying article on plastics in India is the last of the series "Wide world of plastics," which started in our May 1956 issue. The countries covered in this series include:

Japan, France, and Israel (May 1956); Great Britain and Argentina (June 1956); Italy (July 1956); Belgium, Holland, and Luxemburg (August 1956); Australia (September 1956); Germany (October 1956); Norway and Sweden (November 1956); Puerto Rico and Spain (December 1956).

In our February issue there will be a feature condensation of the world plastics picture showing the economic interrelationships between the major plastics-producing countries.

Table I: Consumption of plastics in India

Raw materials	*Consumption*
	1000 lb.
Phenol formaldehyde	2400
Urea formaldehyde	1000
Cellulose acetate and cellulose acetate butyrate	1600
Nitrocellulose (industrial)	1200
Polystyrene	7000
Polyvinyl chloride	3000
Polyethylene	7000

being produced domestically in India. Sirsilk Hyderabad Co. is producing acetate rayon and plans to produce acetate flake when demand warrants production.

The Indian government is considering a proposal to set up a domestic synthetic rubber plant. A team of foreign experts is visiting India in order to prepare a report which would evaluate the economic feasibility of establishing such a plant. These experts are particularly interested in ascertaining whether or not there are any natural resources that are available for the production of styrene and butadiene materials.

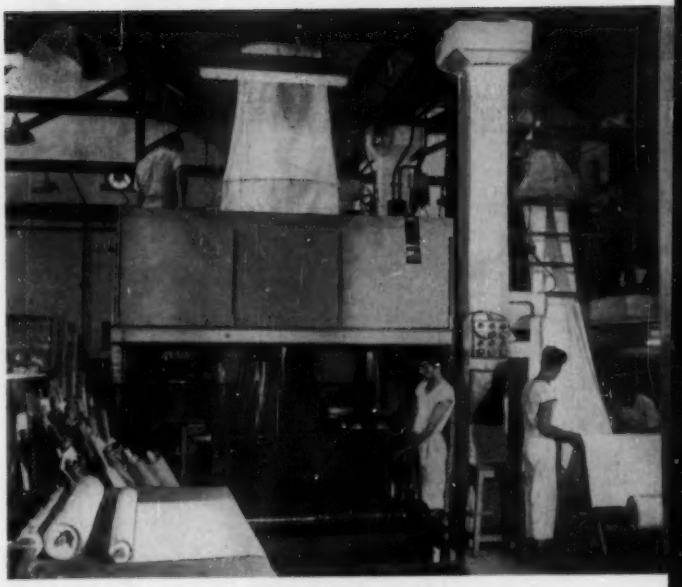
Machinery and molds

There are approximately 400 injection molding machines in India with a total capacity of 800 oz., among which 3-oz machines are most common; however, there are a sizable number of 8-oz. machines and a few 12-oz. machines. All of the injection molding equipment is imported except for small machines rated at less than 1 ounce.

There are approximately 225 compression molding machines in India with a total annual production capacity of 25,000,000 pounds. Small compression molding presses are made in India; all large presses are imported.

About 50 extrusion machines, ranging in size from 1 to 4½ in., are in operation in the country. Vacuum forming is a very recent development in India, with only a small number of machines now in operation.

Approximately 250 molds are used annually by the industry. Simple molds are made in India, but all complicated molds are imported. For some time now the government has recognized a need for establishing facilities to manufacture molds and dies. As far back as 1953 the government of India invited a United Nations technical expert to assist it in founding a mold industry. The government is now negotiating for additional technical experts to advise it further on this matter.



View of take-up end of two twin-screw Windsor extruders used to produce unsupported polyvinyl chloride sheeting at the Bombay plant of Plastic and Industrial Corp.

Plastics processing

Prior to the second World War, there were only a few plastics processing plants in India; in 1948 there were about 40 plants; at present there are 120 plants in the country employing about 15,000 workers. These plants represent an investment of about $16,000,000.

Processes employed by the industry for manufacturing plastics are as follows: compression and transfer molding, injection mold-

Table II: Production of phenol formaldehyde in India

Year	*Production*
	1000 lb.
1951	808
1952	596
1953	762
1954	944
1955	1456
1956 (estimated)	2000



Long-playing phonograph records are molded in India by Plastic and Industrial Corp., using a special grade of polystyrene material supplied by Bakelite Co.

ing, extrusion, blow molding, fabrication of molded and extruded components, coating of fabrics, and lamination.

Compression molding is used to manufacture electrical accessories, buttons, closures for bottles, radio accessories, telephone equipment, kitchenware, ashtrays, etc. Injection molding is used for producing toys, fountain pens, tooth brush handles, combs, cosmetic cases, wall tiles, textile bobbins, records, housewares, sign letters, etc.

Products commonly produced by extrusion are straps, belts, rigid and flexible rods and tubes, insulated wire and cable, pipe, unsupported polyvinyl chloride sheet, various profiles, etc.

Articles produced by fabricating plastics include spectacle frames, novelties, umbrella handles, wallets, handbags, etc. Blow molding is used for the manufacture of polyethylene squeeze bottles, unbreakable toys, etc. Phenolic laminates are produced for general purpose mechanical, electrical, and construction purposes. Polyvinyl chloride resins are used as coatings in producing a wide variety upholstery materials.

Polyvinyl chloride sheet is being extruded in thicknesses of from 0.008 to 0.02 inch. Two producers of calendered vinyl chloride sheet have made known their plans to shortly enter the market.

Considerable interest has been aroused regarding the use of plastics pipe for sanitation and water supply applications. Pipe is now being extruded in India, and plans have been finalized for a new producer with a capacity of about 600,000 lb./year.

Imports and exports

Growth of the plastics industry during the past five years can be seen in the country's imports of raw materials and semi-processed goods. Imports of plastics resins have more than tripled between 1950 and 1956. The value of imported semi-fabricated plastics materials has doubled during this same period. The country imports nearly 14,000,000 lb./year of molding powders and semi-processed goods. Estimated demand for these imported materials in 1956 is shown in Table III, below.

A recent decline in exports is attributed to keen competition from Hong Kong manufacturers and to increased home demand for plastics products. The government of India has evinced great interest in increasing exports. A Plastics Export Promotion Council has been especially set up to promote the export of plastics goods by undertaking studies of foreign markets, sending trade delegations to foreign countries, collecting statistics, laying down standards of quality in packing regarding plastics destined for export, etc. The government has also provided for rebates of import duties on materials used in the manufacture

Table III: India's plastics imports

Material	*Quantity*
	1000 lb.
Phenol formaldehyde molding powder (electrical grade)	600
Urea formaldehyde molding powder	600
Polystyrene molding powder	5000
Cellulose acetate and cellulose acetate butyrate (molding powder and sheets)	1000
Polyvinyl chloride resins and compounds	2000
Polyethylene molding powder	1600
Cellulose nitrate sheets, rods, and tubes	400
Acrylic sheets, rods, and tubes	400
Nitrocellulose (industrial)	500
Nylon monofilaments and powder	100
Polyvinyl chloride sheets (unsupported)	1200

Table IV: Production of certain plastics products in India

Products	Production 1952	1953	1954	1955
Semi-processed materials				
Phenolic laminated sheets, lb.	80,000	50,000	198,000	280,600
Plastic-coated cloth, million yd.	0.95	0.99	1.30	2.62
Polyethylene film and lay flat tubing, lb.	36,000	226,000	732,600	763,600
Polyvinyl chloride sheets, million sq. yd.	—	—	0.36	0.61
Finished products				
Electrical parts made of phenol formaldehyde, gross	—	37,836	39,165	56,858
Polyvinyl chloride cable and wire, million yd.	3.99	3.75	4.23	10.87
Toothbrushes, millions	2.80	3.70	3.70	4.60
Spectacle frames, millions	0.64	0.80	0.70	0.70
Fountain pens, millions	3.80	5.20	5.00	6.00
Buttons, million gross	0.86	0.87	0.95	1.30

of exported goods. This rebate concession is given for export of materials containing urea-formaldehyde molding powder, polystyrene, acetate, and butyrate.

In June 1956 the government set up a committee to develop an export credit guarantee plan. This committee has recommended the institution of a plan similar to one already in force in the United Kingdom which would insure export risks.

India exports plastics goods to about 25 countries. Principal consuming areas are Burma, Ceylon, Pakistan, Malaya, Indonesia, East Africa, Mauritius and Fiji Islands, and others.

The government's import policy is designed to aid the development of an indiginous plastics industry. Tariff protection laws are aimed at restricting the importing of finished goods. Items commonly made in India, such as toothbrushes, electrical accessories, insulated cable and wire, fountain pens, and buttons are only permitted to come into the country in token quantities. The importing of raw materials and semi-processed products manufactured in India is also greatly restricted.

To date, India's plastics industry has been largely devoted to production of consumer goods (see Table IV, above). During the next five years the industry will be encouraged to broaden its scope of activities to include production of industrial goods as well as consumer goods. The government has planned the basic development of the plastics industry in India in three stages, as follows:

a) Manufacture of finished and semi-finished plastics goods.

b) Manufacture of plastics raw materials from imported chemicals.

c) Eventual manufacture of basic chemicals used in production of plastics raw materials.

Standards

The All India Plastics Manufacturers' Association has recognized the importance of setting up proper standards to insure the quality of plastics products made in India. The Association is cooperating with the Indian Standards Institute, a semi-governmental body that formulates standards for various industries.

Standards have already been set up for certain plastic electrical accessories and polyvinyl chloride cables. Standards have been drafted for phenol-formaldehyde molding powder.

As noted previously, steps have already been taken by the Indian government to make the plastics industry less dependent upon imported raw materials, machinery, and molds. With the second Five Year Plan putting strong emphasis on rapid industrialization, and with indications of growing general economic prosperity in the country, the future of the plastics industry in India is very promising.

Beautiful disposables

A new concept in polyethylene film decoration has led to a new concept in the marketing of film.

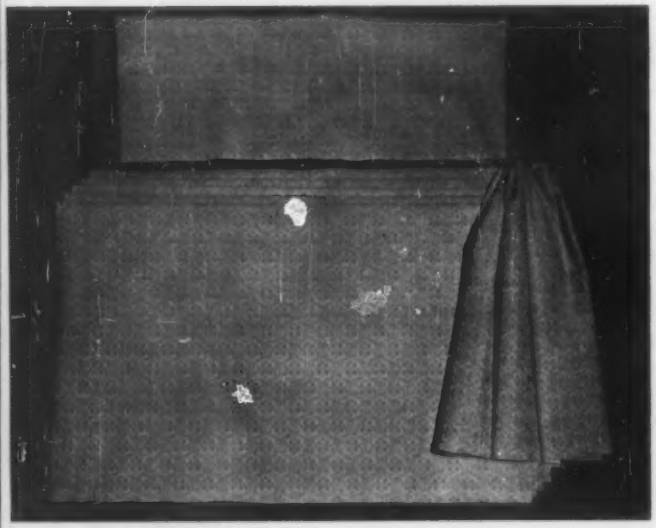
By a single-pass process developed by Hartford Textile Corp., pigmented polyethylene film is pressure-embossed and inlay-printed in perfect register with the embossing at rates in excess of 50 yd./min. The economy of the process combined with the beauty of the finished product is opening up to this material a market in "disposable" drapes, tablecloths, place settings, and other decorative items.

While the process is adaptable to films other than polyethylene, including the vinyls, it was basically designed to handle polyethylene in thin gages and at high speed. The equipment combines a printing press with the principle of using heat and physical pressure for embossing. Not only can this equipment perform printing and embossing at the same time; to it can be added laminating equipment for heavier gage work.

The company purchases polyethylene film, pigmented to order in pastel shades. The development of dyes for the process was the subject of months of research by Claremont Pigment Dispersion Corp. and Interchemical Corp. The film, pretreated for printing, is supplied by The Visking Corp. Special inks, including metallics, perfected by Interchemical, are used.

The yield from a 72 in. wide film ranges from 7 to 8 yd/lb., which means that the polyethylene film is decorated at a rate of 7½ lb./min. or 450 lb./hr., probably a record for high-speed decorating of plastics films.

Not only does the process lend itself to seasonal selling of materials designed with motifs suitable for Christmas, Halloween, Thanksgiving, Easter, and other special occasions; it lends itself also to the economical creation of design obsolescence. Since the price of the finished, fabricated product is so low—a 54 by 54 in. tablecloth sells for 79 cents, a 54 by 72-in.



Decorated polyethylene film, used to make skirt for dressing table, is measured in six equal lengths

Seams 1 in. wide are used with an extra 4 in. at top and bottom for heading and hems. Top is gathered and shirred



Huge new market for polyethylene film is opened up by single-pass pressure-embossing and printing process that handles film economically at high speed

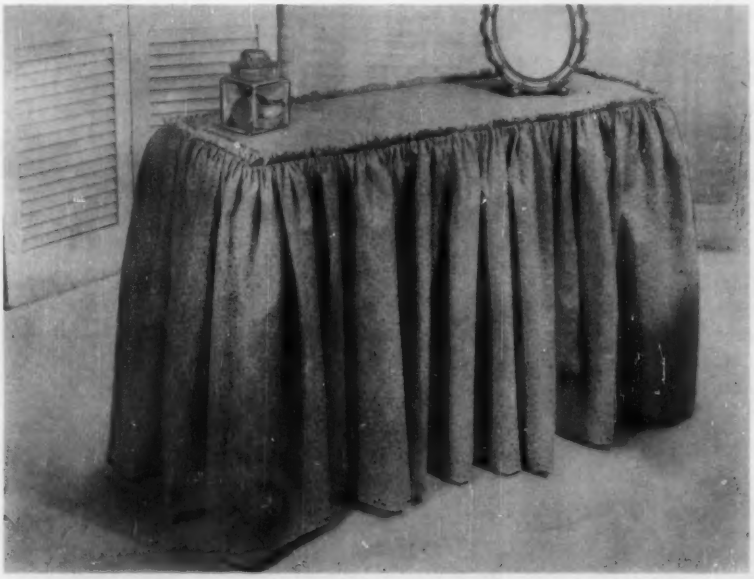
cloth for 98 cents—a housewife can afford to throw away the product after a few uses. The company at present has embossing and printing rolls for over a thousand designs and is constantly producing new ones. It does no fabricating itself but distributes through film fabricators who produce draperies, yardgoods units, tablecloths, place mats, and other similar products.

Moving into paper field

Thus polyethylene moves as another factor into a field long dominated by the paper napkin and tablecloth, fitting into the trend toward casual living and greater ease for the housewife. With larger families the rule today, it is estimated that the potential market per family would be between 20 and 25 table covers alone per year, which would mean a market of somewhere between 30 and 40 yards of polyethylene film per family per year, depending on the size of the table covers purchased.



Pigmented polyethylene film, pressure-embossed and inlay-printed by new process, brings great beauty to disposable merchandise



Finished "do-it-yourself" dressing table made from inlay-printed polyethylene film is attractive, low in cost, and disposable

Polyethylene foliage

Ageless house plants ranging from philodendron to elephant ear in size, and which eliminate the necessity of everyday care, are being molded in polyethylene.

Exact foliage reproductions are achieved by forming polyethylene film by heat and pressure in plaster molds made from actual impressions of leaves. The thickness of the film varies from 15 to 20 gage, depending upon the size of the leaf.

The foliage is fadeproof and dust resistant. It is also unaffected by temperature extremes—will not become tacky in hot weather nor turn brittle even at freezing temperatures.

Credits: Artificial house plants manufactured by Stanley Bernstein, Bronx, N. Y. Visqueen polyethylene film produced by the Visking Corporation, Terre Haute, Ind.



PLASTICS

Butyrate cart clip

New butyrate golf Kart Klip which can be easily attached to all cart handles now puts essential items of equipment at the golfer's fingertips. Two balls are held firmly in the tubular top section by means of thin ridges molded along the inside surface, but the balls can be easily removed by sliding them out of either end. Six "fingers" molded into holes in the sides of the top section hold a pencil and five tees firmly.

The Kart Klip, which is molded in a single cavity mold, is weather-resistant and can be left on the handle permanently or detached for storage by loosening a wing screw.

Credits: Golf Kart Klip manufactured by Jad Products, Toledo, Ohio. Molded by Toledo Plastics Co., Toledo, Ohio. Tenite butyrate supplied by Eastman Chemical Products, Inc., New York, N. Y.



Styrene brooms

Crimped bristles of extruded styrene used in a new line of household brooms were developed to make possible the stitching of long bristles, so that these brooms could be made as long as corn brooms. Straight styrene bristles cannot be stitched. The longer crimped bristles are more flexible than straight ones, vastly improving the sweeping qualities of the brooms.

The bristle holders are molded from high-impact styrene and are virtually unbreakable. The properties of the materials used permit all parts of the brooms to withstand repeated washings. The integral colors—pink, blue, turquoise and yellow—will not fade or stain.

Credits: Brooms are manufactured by Modglin Company, Inc., Los Angeles, Calif. Styrene and high-impact styrene supplied by Catalin Corporation of America, New York, N. Y.



PRODUCTS

Styrene measuring-scoop funnel

Transparent styrene Scoop Funnel promises to solve messy pouring and measuring problems because of its built-in flow control feature. A rubber washer at the base of the control valve releases the contents of the scoop when the control fins are lifted by the thumb; the flow can be cut off instantly by downward thumb pressure on the fins.

Molded-in markings on the Scoop Funnel indicate measurements from ¼ teaspoon to 4 tablespoons. The funnel is ideal for filling salt shakers, small-neck bottles, and vials, and the ability to measure very small amounts suggests the possibility of using the funnel for accurately mixing the ingredients of various recipes.

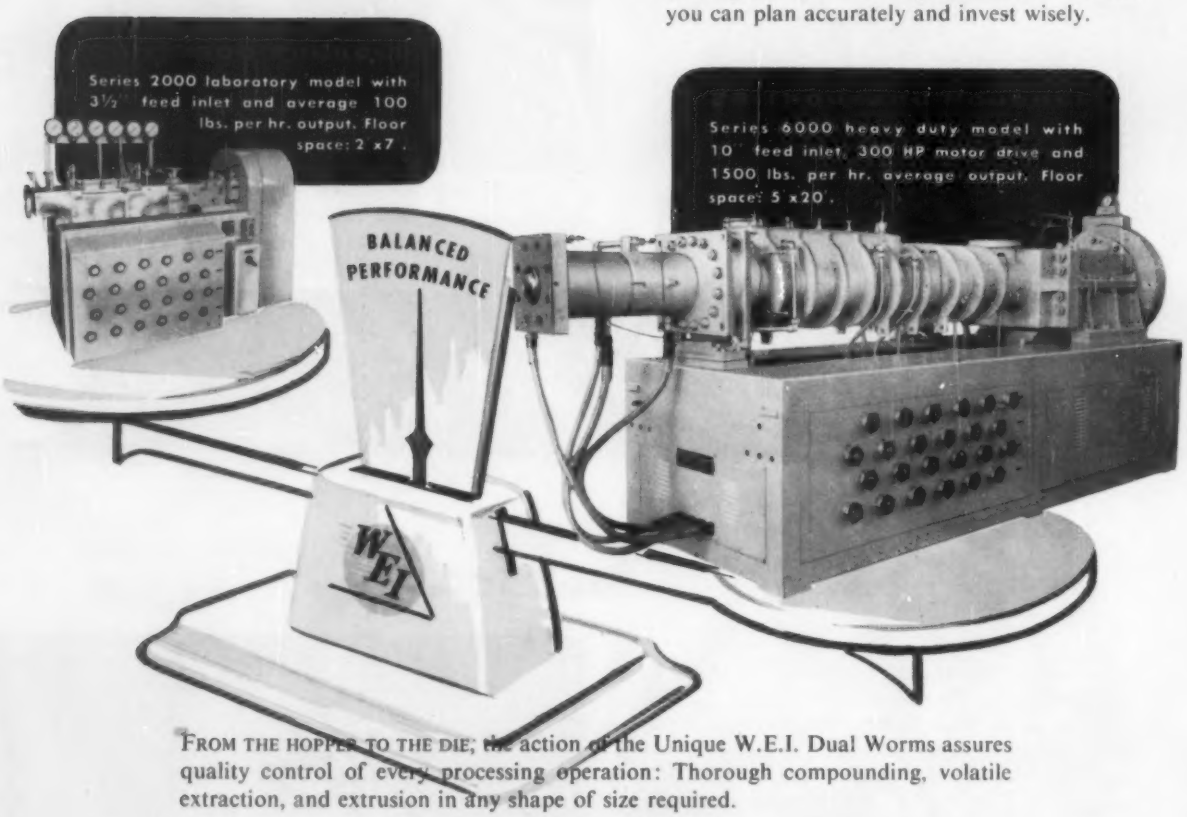
Credits: Scoop Funnel manufactured by Chester R. Nicodemus Co., Columbus, Ohio. Molded by Sun Plastics Co., Cuyahoga Falls, Ohio.



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The various barrel designs and flight characteristics of the dual worms permit a wide range of processing abilities with thermoplastics and rubber including densifying fluffy feeds, coloring plastics, devolatilizing monomers, water, etc., on polyethylene, polystyrene, copolymers, acrylics and practically any extrudable material. Send for catalog no. 663.

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Plastics Engineering

Dr. James F. Carley, Engineering Editor

1956 Highlights

Concise summaries of the important published contributions to plastics engineering in the past year

Plastics engineering had a good year in 1956, one in which solid advances were made in nearly all of its important branches. Some 60 leading articles and research papers appearing between November 1955 and November 1956 are summarized here in ten sections. Most were chosen because, in the editor's opinion, they made a valuable contribution to some phase of plastics engineering; a few were chosen because they were excellent reviews or groupings of scattered information.

Designing with plastics

"How to pick the right polyethylene," by ***E. T. Darden*** and **C. F. Hammer,** *Materials and Methods 44,* 94 (Sept. 1956).

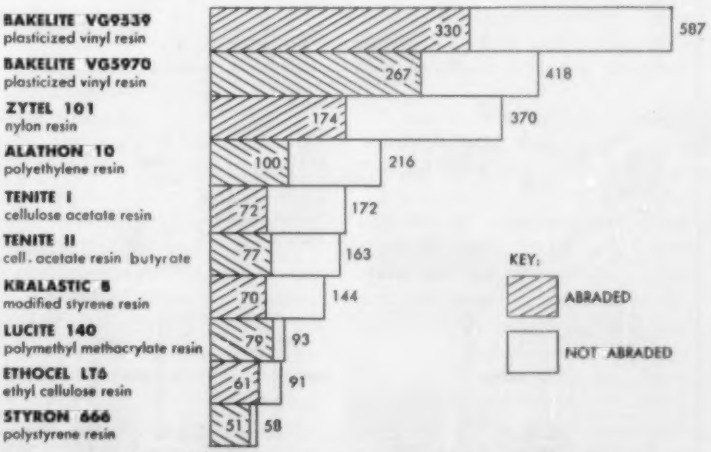
Working from three fundamental characterizing properties of polymer structure—crystallinity (as measured by density), melt index, and breadth of molecular weight distribution—the authors show how various combinations of properties important to application and fabrication may be developed by specifying the proper values of the fundamental properties. Tensile strength, tear strength, modulus, flex life, etc. are all considered in the light of these three properties. The breadth of molecular-weight distribution is measured by the ratio of weight-average molecular weight to number-average, and the meanings of these terms are made crystal-clear via a simple analogy.

"Mechanical properties of plastics dielectrics," by ***B. Maxwell,*** *Electrical Mfg.* p. 146 (Sept. 1956).

Working from fundamentals of plastics behavior, Prof. Maxwell examines the properties of plastics which are important to the design of electrical insulating parts. He points out that during the service life of a dielectric it is subjected to various environmental and dynamic conditions, as well as electrical ones. All these factors must be taken into account in design. The author has summarized in terms of basic theory, experimental data, and design interpretation, the results of an extensive research into the mechanical properties of plastics dielectrics.

"Plastics — engineering materials," by ***C. H. Adams,*** MODERN PLASTICS *33,* 127 (July 1956).

Plastics are examined as materials of construction and com-



Graph demonstrates the ability of new tensile-impact test to isolate various impact phenomena important to the designer. Abraded samples were severely rubbed with #80 emery before being tested. (See discussion in text on p. 130)

* Reg. U.S. Pat. Off.

pared as such with steel, wood, concrete, and glass. They surpass the last three in tensile strength, but are low in elastic modulus (reinforced plastics excepted) and in top use temperature, and have by far the largest coefficients of expansion. The different families of plastics are further compared among themselves on the same bases. A valuable table gives the relative weights of different engineering materials required to meet various strength criteria associated with the different kinds of stresses in structures.

"Plastics as materials of construction," by ***R. B. Seymour***, *Ind. Eng. Chem. 48,* 1760 (Sept. 1956).

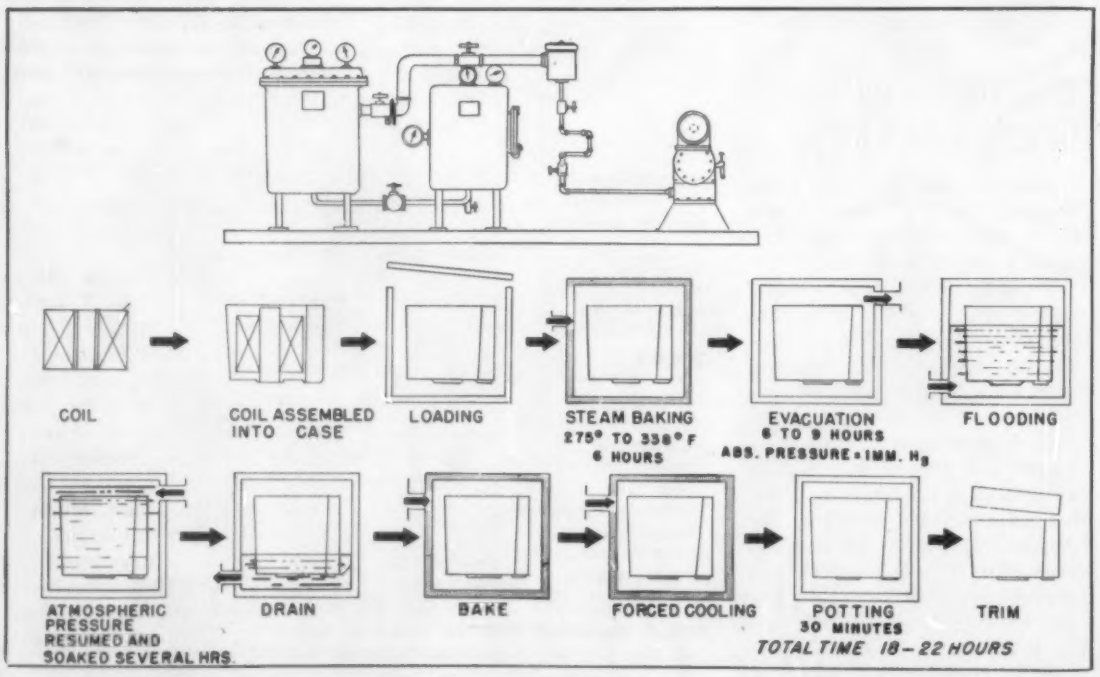
This is part of the annual review series of the magazine, and contains an exhaustive bibliography of material appearing on this subject in the interval from mid-1955 to mid-1956.

"Tensile-impact: a simple, meaningful impact test," by ***C. G. Bragaw***, MODERN PLASTICS *33,* 199 (June 1956).

It has long been recognized that the notched-Izod test correlates very poorly with impact behavior in the field. The equipment used for that test can be inexpensively modified to permit impact testing of a variety of test specimens in pure tension. This simplifies interpretation of test results and makes it possible to isolate for study many special effects (such as notch sensitivity) connected with impact behavior. Values for typical plastics vary from 39 to 2000 ft.-lb./cu. in. Test results check well with results of end-use impact tests of plastic articles. It is shown that Izod-test results may often be predominantly indicative of notch sensitivity rather than the ability of the material to withstand high-velocity loads.

Plastic pipe is being used more all the time, and will probably get much wider acceptance when its engineering attributes, particularly its long-term performance is more reliably known. Creep, fatigue, and solvent cracking are the big question marks. This year three articles presenting the latest engineering information on three plastics in pipe appeared in *Plastics Technology*. All contained information on properties, applications, and creep behavior. They were: **"Fabrication and properties of Kralastic pipe,"** by ***P. M. Elliott*** (May, p. 301); **"Properties and applications of butyrate pipe,"** by ***L. W. A. Meyer*** and ***R. J. Scogin*** (June, p. 383); and **"Properties and uses of polyethylene pipe,"** by ***C. G. Bragaw, Jr.*** (Sept., p. 594). The last considers only low-density polyethylene, the only one on which there is any body of data. A comparison of the six major types of plastic pipe with the important metal piping materials was made in **"Plastics pipe,"** by ***R. G. Bogan***, *Materials & Methods, 44,* 100 (Aug. 1956).

Specifications—Aside from the problem of estimating how a given plastic will perform in a particular application, there is the related problem of making sure that the plastic you have, both before and after molding, is the plastic you *think* you have. One way to be sure is to purchase "by specifications." ***W. C. Wall*** and ***R. E. Brooks*** propose, in **"Definitive specifications for plastics materials,"** *SPE Journal 12,* 28 (May 1956), that two batteries of tests be run. The first will positively identify the plastic, the second will assess changes occur-



Diagrammatic representation of potting by vacuum method, showing successive steps of process. (See text, p. 132)

ring during processing. The proposal is illustrated by suggested experimental tests for a sample polyamide.

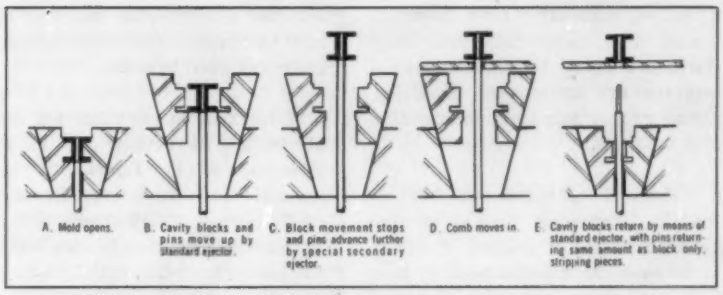
"Zytel and Teflon resins as bearing materials," (in two parts), by ***A. J. Cheney, W. B. Happoldt,*** and ***K. G. Swayne,*** *Plastics Tech. 2,* 221, 314 (Apr. and May 1956).

The general mechanical properties (including creep), the frictional properties, and the wearing qualities of nylon-66 and Teflon are reviewed, and for the first time all this information on these two important bearing materials is assembled in one place. Fourteen references.

"Heat distortion temperature measurements for evaluation of thermoplastics," by ***J. J. Gouza*** and ***W. F. Bartoe,*** *Plastics Tech. 2,* 89 (Feb. 1956).

A detailed study of the distortion of plastics in bending as a function of applied stress and temperature reveals characteristic behaviors in thermoplastics and cast thermosets. Thermoplastics have threshold temperatures at any given stress at which they rather suddenly show very large distortions. These thresholds and their dependence on stress are different for the several thermoplasts tested. Thermosets, on the other hand, show only limited creep at the lower stresses (less than 100 p.s.i.) no matter what the temperature. Thus distortion-temperature testing over a range of stresses is a measure of the degree of cross linking in a plastic. The temperature at which the beam deflection is 100 mils at an outside fiber stress of 10 p.s.i. is shown to be the same as the temperature at which the material has zero tensile and flexural strength in the standard ASTM tests.

"Designing with transparent plastics," *SPE Journal 12,* 28 (Feb. 1956), by ***A. M. Blumenfeld,*** presents, with clear diagrams, helpful hints for avoiding unwanted reflections concealing holes and inserts, making painting easier, etc. Three generalities of good design with transparent materials: avoid plane surfaces and sharp changes in direction on first surface; apply marking to second surface.



Tapered split mold for automatic molding of coil forms, shown in successive stages of operation. (See text, p. 132)

General processing

"Plastics engineering in the years ahead," MODERN PLASTICS *33,* 179 (June 1956).

Extrapolation of present trends in plastics engineering indicates that greater productivity, better and more uniform quality, and lower unit costs are coming in the important branches of plastics processing, in spite of higher labor costs. These objectives will be achieved by application of sound engineering science to machine design and process operation, by extension of automation and by new invention.

"Casting plastics sheets," by ***J. O. Beattie,*** MODERN PLASTICS *33,* 109 (July 1956).

Polymerization of liquid monomers or monomer-polymer sirups between glass plates produces plastics sheets of unequaled optical properties. Typical casting resins are made of acrylic esters, an allyl ester (CR-39), phenol-formaldehyde resins, and copolymers. Detailed procedures are given for casting and curing the monomers and for annealing the cured sheets. The casting characteristics and sheet properties of the first three materials are discussed in detail. Acrylic esters, the most popular sheet-casting materials, are also the most difficult to cure because of a very sudden, large evolution of heat late in the curing cycle. Where optical properties are not a requirement, thin cast sheets are more costly than thin extruded sheets. For methyl methacrylate, sheets over 0.1 in. in thickness are more economically cast than extruded.

"Control of chemical and physical factors in the application of casting resins," by ***P. L. Nichols,*** *SPE Journal 12,* 26 (Nov. 1956).

In this rather technical article, the author first discusses the kinetic and heat transfer factors connected with the curing of casting resins, and calculates some detailed temperature distributions from the differential equations. He then discusses the mechanical properties of filled resins on the basis of new mechanical models that have a frictional or "sliding-block" element in addition to the usual viscous and elastic ones. These seem to fit experimental stress-strain curves well when the right set of parameters has been found, but a high-speed computer is almost a necessity for their application. Sixteen helpful references included.

"Causes of fish-eyes in vinyl articles," by ***M. R. Rector,*** *Plastics Tech. 2,* 390 (June 1956).

Fish-eyes in vinyl (and probably in other thermoplastics) are caused by differences in the flow characteristics of individual resin particles under processing conditions. In vinyls this is often due to preferential plasticizer absorption, in turn caused by variations in capillary and diffusion qualities of the particles. Even trace-level contamination with dirt and lint, with higher-molecular-weight polymer, with coarser particles or particles of lower porosity, or

with previously fused material, may also cause fish-eyes. They are prevented by careful manufacturing, meticulous handling, and proper attention to blending techniques.

Printed circuitry—A beautifully illustrated article on the manufacture of printed circuitry, **"Copper-clad phenolic/paper laminates for printed circuits,"** appeared in *Brit. Plastics 29*, 15 (Jan. 1956). Most of the article is devoted to telling how the printed circuit is put on the laminate. Especially interesting is a series of five illustrations, printed in copper inks, showing the successive stages in making a circuit from a copper-clad laminate.

"Potting and encapsulation," by ***F. G. Firth,*** MODERN PLASTICS *33*, 125 (Apr. 1956).

The properties of monomer-resin mixtures used for potting and encapsulation are compared with those of an "ideal" potting resin. The author reviews the chemistry of curing reactions, discusses the structure of the cured resins, and tells how to formulate casting sirups for different applications. The practical details of potting by the vacuum method and by the centrifugal method are given in full, along with pros and cons. The important questions of how to make either temporary or permanent molds, of what materials to use, and of how to obtain clean mold release are considered in detail.

"Effects of fabrication on the properties of Teflon," by ***P. E. Thomas, J. F. Lontz, C. A. Sperati,*** and ***J. L. McPherson,*** *SPE Journal, 12*, 89 (June 1956).

The title accurately describes the contents of this article, which contains a wealth of detailed information. The entire discussion is based on fundamentals, though extensive data on actual processing results are given. Principles are applied to securing the desired properties and to solving molding problems.

"Polymerization control in casting a thermosetting resin," by ***W. R. Dial, W. E. Bissinger, B. J. DeWitt,*** and ***F. Strain,*** *Ind. Eng. Chem. 47*, 2447 (Dec. 1955).

Kinetic analysis of the highly exothermic polymerization of CR-39 (an allyl resin) led to the development of a rising temperature curing cycle that gives a constant rate of heat evolution. Sheets 0.25 in. thick may be cured in 12 hr., thinner sheets in much less time, depending on heat transfer factors.

"Compounding and processing styrene copolymer resins," by ***R. J. McCutcheon*** and ***K. K. Fligor,*** *Plastics Tech. 2*, 95 (Feb. 1956).

Some properties of Plio-Tuf, pure and loaded, and its compounds with neoprene GN are presented. An unusual table shows the results of repeated physical tests on samples stored for 20 months in the laboratory, and sheds much light on the reproducibility of such tests over long periods. Compounding hints are given. Tensile strength and stiffness drop about 25% as injection cylinder temperature is raised from 375 to 475° F. Recommended conditions for milling, calendering, and molding are given.

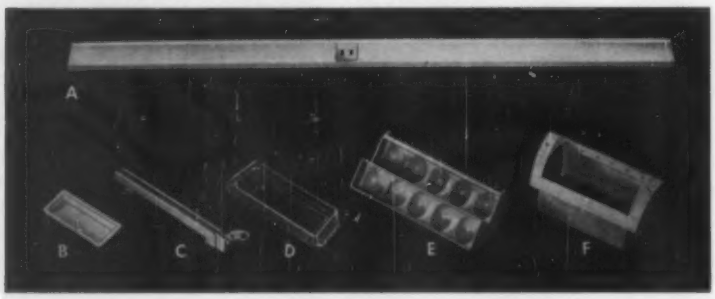
"Cure in thermosetting resins," (a series of papers by many authors), *Ind. Eng. Chem. 48*, 71-109 (Jan. 1956).

The results of new researches on many aspects of curing, some general, some concerned with specific resins, are covered.

Thermoset molding

While there has been progress toward automation in almost all branches of plastics processing and fabricating this year, it seems to have been particularly striking in compression and transfer molding. Possibly this is because cumulative experience in compression molding is much greater. The molding presses themselves have been highly developed for some years, and this year's developments have been more concentrated on the auxiliaries—the molds, the feeders, and the preheaters. **"Automatic molding of coil forms,"** MODERN PLASTICS *33*, 138 (Mar. 1956), presented an ingenious mold design that permits the completely automatic compression molding of coil forms, which had previously been removed from the mold by hand. In his article, **"Advances in thermoset molding,"** MODERN PLASTICS *33*, 145 (May 1956) ***E. F. Borro*** discussed an automatic feeder that can be adjusted to load any reasonable number of cavities with metered shots of molding powder. He described completely automatic transfer presses that run for hours without attention. He also presented data showing that the use of fast-curing resins, high mold temperatures, and, above

Refrigerator manufacturer, asking for bids on six parts for one model, found price variation shown below photo. (See p. 133)



A) Breaker trim — 5 bids invited — High bid 10% over low

B) Butter tray — 5 bids invited — High bid 60% over low

C) Chiller slide — 5 bids invited — High bid 30% over low

D) Utility tray — 7 bids invited — High bid 50% over low

E) Egg rack — 8 bids invited — High bid 25% over low

F) Butter compartment — 7 bids invited — High bid 30% over low

all, high preheating temperatures, can substantially reduce the cycle time.

"Internal pressure distribution in molding phenolic test bars," by ***J. M. Rausch*** and ***W. Orvis,*** *SPE Journal 12,* 24 (Jan. 1956), describes measurements of pressure during transfer molding in end-gated test bars of different sizes, with various-size gates. Most of the work was done with two-stage resins, but some shots of one-stage resin were made. Charts showing pressure *vs.* time at various points in the mold were presented. Somewhat startling was the finding that pressure in the mold may exceed the applied pressure by as much as one-third. Startling, also, was the finding that in a ½- by ¼-in. bar, the pressure at two points only 2.4 in. apart sometimes differed by 700 p.s.i. (in 2000 p.s.i.) long after the mold was filled. These results are explained on the basis of the resin characteristics, gas evolution, and differences found in heat transfer rates.

Injection molding

"The cause and cure of unrealistic quotes on plastics parts," by a panel of four members: ***C. T. Dyson*** (purchaser), ***N. Porte*** (custom molder), ***W. H. Nussbaum*** (accountant), and ***J. A. Kavanagh*** (mold maker). MODERN PLASTICS *33,* 81 (July 1956).

Bids on molding contracts for typical refrigerator parts have varied greatly, the high bid sometimes being 60% over the low one! The principal reasons seem to be: 1) misunderstanding of job requirements, 2) slipshod estimating methods, 3) failure to include all cost elements, and 4) lack of appreciation of factors contributing to costs of mold. There are even "almost absurd" variations in the estimates of what the finished piece will weigh! On analysis, most of these factors can be traced to faulty engineering on the part of one or more of the parties involved. Estimating methods must closely parallel cost finding methods, and molding jobs must be scientifically engineered, with accurate estimation of such factors as material needed, amount of scrap, cost of working to close tolerances in making the mold, and the cost of overtime work needed to get extra-fast delivery from the mold maker.

Preplasticators—A lot has been said about how preplasticators can make great big shots. But in **"Preplasticators pay off on small shots, too!",** MODERN PLASTICS *34,* 143 (Nov. 1956), ***H. H. Schwartz*** shows how preplasticators can raise productivity and improve quality in making fraction-of-capacity shots. In such service, their evening-out of melt temperature and large heat-transfer area makes it possible to work more closely to whichever extreme of temperature is needed than would be possible with a standard cylinder. Faster filling rates, less danger of flashing, and shorter strokes all contribute to higher output per man-hour and stress-free, more uniformly dimensioned products. Shot-to-shot variation in piece weight is sharply reduced, making it possible to keep most of the machine's output within reasonably tight dimensional tolerances.

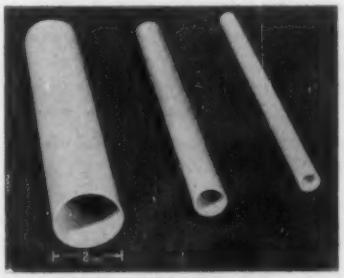
Moldability has ever been an elusive characteristic to measure. In **"A new measure of plastic moldability,"** by ***D. B. Semeyn,*** *SPE Journal 12,* 15 (May 1956), a beginning has been made toward establishing a quantitative rating of moldability. Using a ribbed, thin-disk mold, some reasonable cycle, mold temperature, etc., are chosen and the cylinder temperature (t) is held constant at some low value near the bottom of the molding range. Shots are made at gradually increasing pressure (P) until the mold just fills. The pressure is then further increased until the mold flashes or the piece sticks in the mold. These two pressure/temperature points are recorded on a plot of cylinder temperature vs. injection pressure. The cylinder temperature is raised 25° F. and the process repeated. The lower pressures form a "short shot line" and the higher a "flash or stick line," and, together with the lower and upper temperature limits, these lines determine an area. From this area, a rather arbitrary function called the "molding area number" is computed.

The second part of the test consists of finding, by a similar procedure, the minimum cycle time in which satisfactory parts can be molded. The final "moldability number" is obtained by dividing the molding area number by the minimum cycle time.

From the standpoint of producing equal ratings in different machines, or comparable ratings among chemically different resins, the method is of little value. But the basic idea of obtaining a moldability rating from the minimum operable cycle and the possible ranges of molding conditions is a real step forward. It will surely be further developed.

"Runner and gate design," MODERN PLASTICS *34,* 166 (Oct. 1956).

With increasing pressure for higher machine productivity and better dimensional uniformity of product, it is becoming more important to fill all the cavities of multi-cavity molds and to get the same amount of plastic into every cavity. To do this, three conditions of simultaneity must be fulfilled: 1) the melt must reach all the gates at the same moment; 2) all the cavities must finish filling together; and 3) all the gates should seal at the same time. One way of achieving all three conditions (in molds where the cavities are identical) is the "organization-chart" or OC runner layout, in which the path to each gate is the same as that to every other,



Thin-wall tetrafluoroethylene tubes produced by extruding Teflon 6 compounded with an extrusion aid. (See p. 138. Photo, Du Pont)

and the gates have identical dimensions. The discussion is based on the underlying flow, compressibility, and heat-transfer characteristics of plastic melts. It is shown that after the melt reaches the gates and the cavities begin to fill, most of the available melt pressure is normally expended in the runners; this finding suggests that tremendously higher filling rates can be obtained by using larger-diameter runners.

"The influence of flow orientation and injection temperature on the strength of injection mouldings," by ***R. A. Horsley*** and ***D. J. A. Lee,*** *Brit. Plastics 29,* 134 (Apr. 1956).

This is an experimental study of impact and flexural strength in 3-in.-sq. 0.060-in.-thick plaques and 5- by ½- by ¼-in. bars of polystyrene. Test specimens were cut from ten positions in the plaques parallel to the direction of flow and ten positions perpendicular to it. The strength, particularly the impact strength, is much higher in the direction of flow than across it, suggesting that in molding thin sections gating should be arranged, if possible, so that moldings are not likely to be stressed in the weak across-flow direction. Both birefringence patterns and shrinkage tests show that the residual stresses in the plaques decrease as cylinder temperature is raised. This fits nicely with the observed rise in impact strength with cylinder temperature. The ¼-in.-thick bars, on the other hand, showed slight decreases in properties with rising cylinder temperatures.

"Polyliner improves injection molding," by ***E. C. Bernhardt*** and ***L. Paggi,*** MODERN PLASTICS *33,* 109 (Feb. 1956).

"The Maccaferri injection molding heating chamber," by ***M. Maccaferri*** and ***R. B. McKee, Jr.,*** *SPE Journal 12,* 11 (Feb. 1956).

Both these articles describe somewhat different versions of "melt-extraction" heaters for injection molding machines. In these heaters a tightly fitting, perforated, grooved liner is substituted for the traditional torpedo. The results: the granules in the rear of the cylinder move much more freely, the melt is heated more uniformly and with a smaller temperature gradient from wall to plastic, and plasticating capacity is often increased. Available pressure at the nozzle is greater and more uniform. The polyliner is somewhat easier—therefore cheaper—to make than the Maccaferri liner, but both give improved quality in molding, and they may increase productivity where the plasticating rate is the limiting factor.



Various shapes and wall thicknesses of epoxy-glass tubing made with woven-sleeve reinforcement show versatility of process. (See text, p. 135. Photo, Shell Chemical Corp.)

"Plug flow and lubrication of polymer particles," by ***H. L. Toor,*** and ***S. D. Eagleton,*** *Ind. Eng. Chem. 48,* 1825 (Oct. 1956).

"The pressure transmitted through a moving bed of unlubricated polystyrene particles is given as a function of pressure, bed length, particle size, and velocity. The results are similar to those obtained by Spencer and coworkers for a static bed, but the apparent coefficient of friction is lower. The addition of lubricant to the particle surfaces may either increase or decrease the transmitted pressure, depending on the specific conditions."

"Injection molding of vinyl chloride dry blends," by ***C. W. Bulkley,*** *SPE Journal 12,* 14 (Feb. 1956).

Advantages and uses of injection molded PVC are discussed. Equipment details, molding know-how, and possible difficulties in molding this heat-sensitive polymer are taken up. The author points out the advantages of using dry blends as opposed to finished pellets; some are: dry blend is 3¢/lb. cheaper, it has not been extruded and so is more stable in the injection machine, it cuts down molding powder inventory, and it offers greater versatility of operation.

"Injection molding research today and tomorrow," by ***J. Eveland, H. J. Karam,*** and ***C. E. Beyer,*** *SPE Journal 12,* 30 (May 1956).

This is a review of the important results of injection molding research since it began. The authors believe the main efforts have been directed to control of the melt pressure. Important factors are 1) accuracy of feeding; 2) size, shape, and treatment of granules; 3) heat transfer and uniformity of temperature in melt zone; 4) design of runners, etc., to get equal pressure in all cavities; and 5) high filling rates. There is a bibliography of 63 of the best references (in English) on the subject.

Laminating

"The shock curing of some laminated materials," by ***C. A. Redfarn*** and ***J. Bedford,*** *Brit. Plastics 29,* 171 (May 1956).

This article describes a revolutionary technique (licensable under BP 737,374) for curing thermosetting resins that has so far been investigated principally in low-pressure laminating. The principle is this: the uncured resin, which must be at least moderately conductive, serves as its own resistance heater. Large-area electrodes, in contact with the laminate and insulated from the press platens, are powered with line-voltage A.C. There is a sudden rise in the current, followed by a rapid fall to a low value, and cure is complete. In a Durestos laminate, for example, which is an asbestos felt impregnated with a soda-catalyzed phenolic resin that normally requires about 4 hr. to cure at 120° C. and 15 min. at 160° C., *the curing time was only 5 seconds!* For this particular material, the preferred conditions are 125° C. platen tem-

perature, 450 p.s.i. pressure, and a voltage of about 100 v. (which gives a current density of 0.25 amp./sq. in.). Some problems are anticipated in curing pieces with large variations in section thickness, and, of course, only conductive materials can be shock cured.

"Balsa cores for reinforced plastics structures," by ***R. Mark,*** MODERN PLASTICS *33,* 181 (May 1956).

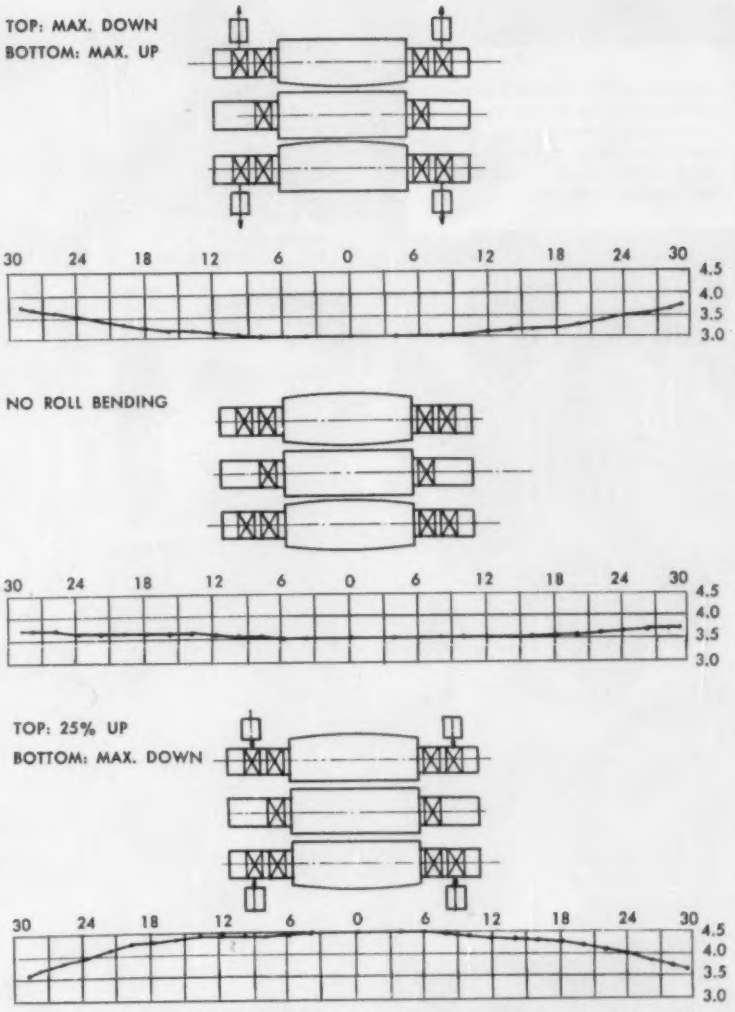
Many thick sections or parts made of reinforced plastics require the use of core materials to reduce weight and cost while keeping stiffness. These and other functions of cores are discussed. Of the available core materials, balsa woods have superior strength and fatigue properties for their weight and cost. The more useful methods of forming balsa cores for curved structures are taken up in detail. Properties of balsa woods important to their use as core materials are given.

"Effect of molding technique on the long-time heat resistance of phenolic laminates," by ***J. D. Flynt,*** *Plastics Tech. 2,* 577 (Sept. 1956).

Glass-phenolic laminates are discussed, with particular reference to the aircraft industry. Laminates made by the vacuum bag method are so porous that oxidative attack at high temperatures proceeds almost as rapidly on interior as on exterior surfaces. After 100 hr. at 500° F. their strength properties have dropped to small fractions of the original values. In a new "low-temperature" curing method, the laminate is typically press-cured at about 260° F. for 30 min. at 160 p.s.i. or more, reaching a translucent state; then it is cooled under pressure and subsequently postcured for 24 hr. each at successive temperatures of 250, 300, and 350° F. The resulting laminate is nonporous and will retain about 75% of original properties after 100 hr. at 500° F.

"Thin-wall, epoxy-glass tubing," by ***W. E. Ponemon,*** MODERN PLASTICS *34,* 139 (Nov. 1956).

By using woven-glass sleeving as the reinforcing material, it has been possible to make longer, smaller, thinner-wall tubing than ever before. Tubes up to 9 ft. long with inside diameters as little as 1/16 in. and wall thicknesses as low as 8 mils have been made. The manufacturing details and some properties of such tubing are given.



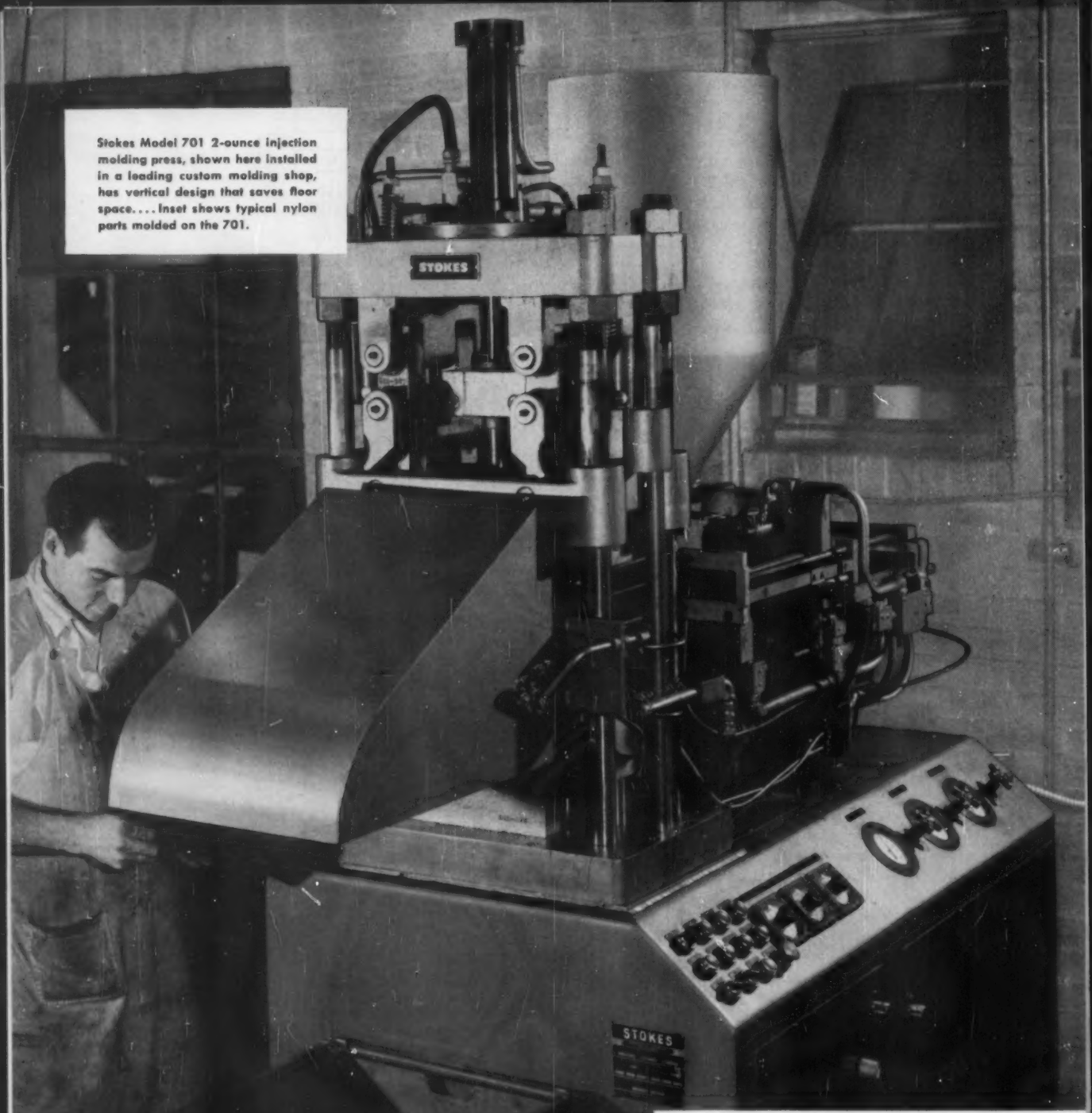
Roll bending of both top and bottom rolls on 24- by 68-in. calender. Sketches show direction of application of bending to rolls. Graphs are thickness profiles of sheet produced under the various roll bending conditions. Sheet is nominally 58 in. wide by 3.75 mils thick. (See discussion in text on p. 140)

Extrusion

"Problems and trends in European extruder design," by ***E. Gaspar, SPE J. 12,*** 23 (Oct. 1956).

The author, a member of Projectile & Engineering Co., describes his investigation of extrusion, undertaken with a view to determining what capabilities the company's new line of screw extruders ought to have. He concludes that single-screw extruders can be made to operate as reliably as double-screw machines and that the output of the single-screw machine, "size for size," is greater. Speeds up to 100 r.p.m., and possibly twice that, are practical; higher speeds probably will not be. Adiabatic extrusion is easily accomplished if the machine is designed for it. L/D ratios greater than 16 do not seem to be needed for straight extrusion. It is encouraging to see a machinery maker publishing

(*To page* 138)



Stokes Model 701 2-ounce injection molding press, shown here installed in a leading custom molding shop, has vertical design that saves floor space.... Inset shows typical nylon parts molded on the 701.

TYPICAL RESULTS ON MOLDING



Only automatic molding on the Stokes 701 Press permits economical use of low-cost, single-cavity die for this nylon pulley.

Automatic molding of nylon is easy . . . and economical . . . on the new Stokes Model 701 Press

New Stokes truly automatic 2-ounce injection molding press incorporates advanced design features that eliminate "drooling," improve uniformity, save material, produce high output at low cost.

If you're molding—or planning to mold—nylon parts, the new Stokes Model 701 is the press you've been looking for. Built into it are features, based on Stokes pioneering experience in automatic molding, which are useful in any injection molding operation . . . and especially valuable when you're molding nylon.

"Drooling" eliminated. The positive nozzle shut-off developed by Stokes prevents the usual troublesome stringing of nylon.

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Close tolerances—low mold cost. The 701 press operates on so fast a cycle—only 3½ seconds between mold opening and start of next fill—that only a few cavities are needed to get high output. The simpler molds cost less . . . and there is less variation in dimensions of parts produced.

Automatic separation of runners and parts. No manual sorting or de-gating is required. Runners can be immediately ground and re-used.

Low labor cost. The 701 requires only about *one-tenth* of a man's time. It molds, de-gates, ejects, and sorts automatically.

Applicable to every injection molding job, the Model 701 proves economical on short or long production runs, and on simple or close-tolerance parts. It is exceptionally easy to set up and to maintain. For complete facts, write for a copy of our latest bulletin. And ask for a consultation by the Stokes Advisory Service to estimate the cost savings that can be realized on your specific parts.

NYLON PARTS WITH THE STOKES MODEL 701 PRESS



Uniform, automatic cycling of the Model 701, and economical output with few cavities, allow close tolerance molding of this nylon roller.



Automatic de-gating and low tooling charges on the Stokes Model 701 make it possible for this mop handle coupling to be made of nylon at a cost competitive with a metal part.

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STOKES

valuable design information while it is still fresh.

"Solids conveying in extruders," by ***W. H. Darnell*** and ***E. A. J. Mol***, *SPE Journal 12*, 20 (Apr. 1956).

By assuming that the material in the feed section of an extruder can be treated as a plug with special properties, the authors have derived equations for the delivery rate in that section. The output per turn of the screw is given as a function of the screw dimensions, the coefficients of friction of the plastic on the screw and barrel surfaces, and the back pressure. Optimum helix angles have been calculated for various coefficients of friction. Experimental rates on three 2-in. feed screws with pellets of nylon, polyethylene, and acrylic resins, and with barrels of varying roughness, were in good agreement with calculated rates. Data on bulk density and coefficients of friction for several polymers are given.

This paper fills one of the two big remaining gaps in the theory of screw extrusion. Of the three zones of the screw, only the melting, or transition, zone remains to be analyzed.

Uniform caliper—A severe sheet extrusion problem is the attainment of uniformity of caliper over the whole width of the sheet. In **"Design and operation of crosshead sheeting dies,"** Modern Plastics *33*, 127 (Aug. 1956), a method is given that permits crosshead (or manifold) dies to be designed very simply to make uniform film. The effects of the several die dimensions, placement of the feed port, and material properties on the performance of dies are discussed. The method applies to blown-film dies as well as flat-sheet dies, and has been followed through for a typical case. Some alternate methods of attaining uniformity are offered, and their relative merits are examined.

"Viscosity data for extruder flow equations," by ***R. D. Sackett***, *SPE Journal 12*, 32 (Oct. 1956).

Melt extrusion theory requires for its application a realistic value for the melt viscosity under extrusion conditions. Since plastic melts are not Newtonian, the authors feel that the most reliable value might be obtained using an existing extruder as a rheometer. With a given screw design, the output, temperature, and terminal pressure are measured; from these values and the extrusion equations, the effective extrusion viscosity may be calculated. It shows the usual changes with shear rate and temperature. In the present state of plastics rheology, this method of measuring viscosity for screw design is probably the safest available.

Polyethylene—Hidden away in one of the *SPE Journal's* regular features is a 2-part work (Oct., p. 49 and Nov., p. 50) by ***B. H. Maddock***, **"Fundamental mechanisms in polyethylene extrusion."** Working from established extrusion theory, Mr. Maddock discusses the results of extrusion experiments with several polyethylene resins. Three resins, four screws (all two-inchers), three dies, and a range of operating conditions were investigated. The results, in graphical form, give a detailed portrait of the behavior of polyethylene in the extrusion process.

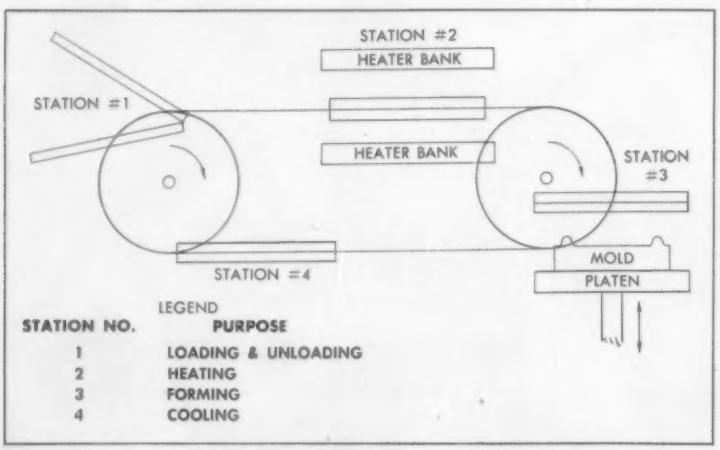
"Paste extrusion," by ***W. B. Thompson, Jr.***, and ***R. E. Stabler***, Modern Plastics *33*, 115 (Feb. 1956).

The range of shapes that may be extruded from Teflon has been greatly extended by a new technique. It consists of adding an extrusion aid, e.g., naphtha or white oil, to a finely powdered form of the resin before extrusion, then evaporating the aid from the extrudate during the sintering step. Complete processing instructions and a pictorial trouble-shooting chart are given.

"Continuous 'imposed-order' mixer-extruder with complementary adjustability," by ***M. S. Frenkel***, *Brit. Plastics 29*, 62 and 98 (Feb. and Mar. 1956).

Dr. Frenkel discusses his invention (patents applied for) from the standpoint of basic requirements of the mixing process. The basic idea is applicable to processes other than extrusion (crushing, for example), but as applied to extrusion, the machine is basically a single-screw extruder. However, the barrel is also threaded and capable of independent rotation in the direction opposite to that of the inner shaft. By building the barrel in segments, which can be independently rotated, it is possible to have alternating zones of increasing and decreasing diameter.

This construction makes it possible, the author says, to impose almost any desired order of movement on the working medium. Going one step further, a barrel outside the barrel, over part of the total length, can be added. Since there would then be three concentrically rotating surfaces,



Schematic side view of four-station automatic thermoforming machine. Note that this machine is designed so that both sides of the sheet are heated. (See discussion in text on p. 140)



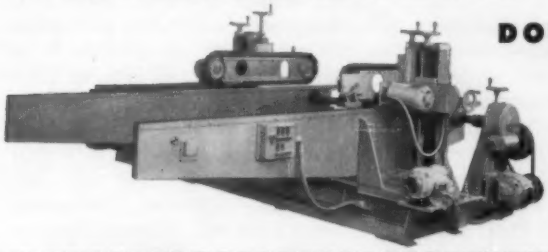
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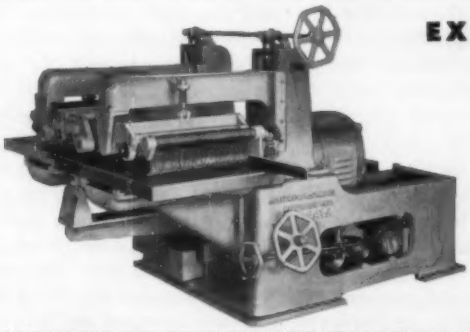


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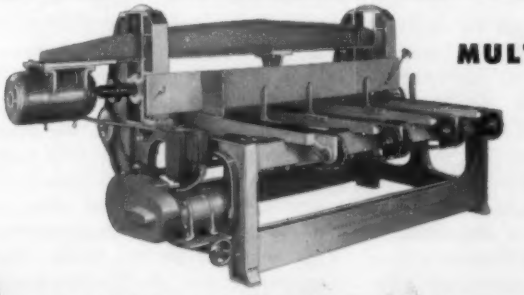


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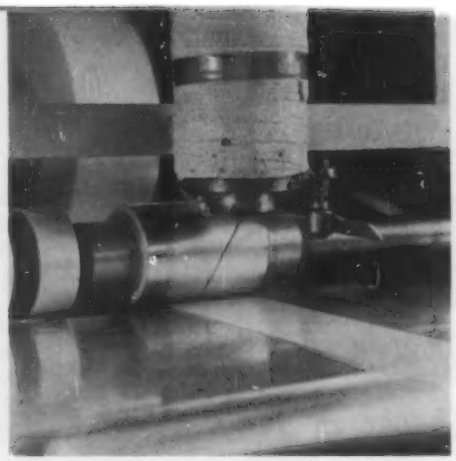
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Close-up of molten-bead heat-sealer in operation. For visibility, black polyethylene is being used for the bead. (See text, p. 234 Photo, Bakelite)

different materials can be processed in the two inter-spaces, and finally mixed or not, as desired.

"The vacuum extruder screw," by ***E. C. Bernhardt,*** *SPE Journal 12,* 40 (Mar. 1956).

Some resins contain between 0.5 and 5% of volatile matter, or tend to pick up water if left exposed to the air. If such resins are extruded in a conventional extruder the extrudate will be bubbly, perhaps even to the point of foaming. There are a number of multi-stage extruders that will handle such materials, removing the volatiles at some point along their vented barrels. This paper presents what is probably the cheapest way to extract the nuisance volatiles: a vented screw that can be used in a standard extruder if its L/D is at least 18. The design and operation of such screws are detailed.

"Melt fracture — extrudate roughness in plastics extrusion," by ***J. P. Tordella,*** *SPE Journal 12,* 36 (Feb. 1956).

The author's experiments show that at shear stresses higher than a critical value (between 50 and 500 p.s.i., roughly, depending on orifice inlet geometry) plastic melts fracture or tear, so that rough extrudates are produced. The degree of roughness may range from a slight waviness to fragmentation. The results imply that to get a smooth extrudate from a given resin at a given temperature, with an inlet as streamlined as possible, the extruder operator may have to be content with a limited rate. Unless he can open up the die, raise the temperature, or use a less viscous resin, any attempt to get higher rates will result in rough-surfaced products.

Calendering

Two important developments in calendering appeared almost simultaneously last spring. In April MODERN PLASTICS, p. 138, ***M. Jukich*** in **"Roll bending"** introduced a new tool for control of caliper in calendering, while in the April *SPE Journal,* p. 17, ***F. D. Dexter*** and ***D. I. Marshall*** explained the **"Calculation of roll separating forces in the calendering and milling of plastics."**

The roll bender offsets the bending of the calender rolls (caused by the pressure generated in squeezing the stock) by applying opposing bending moments to the rolls. A very accurate correction can be made, the device is easy to add to an existing calender, and it is much less expensive than roll-crossing equipment. In a sheet about 4 mils thick and 72 in. wide, the mid-sheet thickness can be changed as much as 2 mils by roll bending.

Using an equation derived by Ardichvili, Dexter and Marshall present a method for computing the total force tending to separate calender and mill rolls during the processing of plastics. The values depend on an apparent viscosity obtained from extrusion plastometer measurements. Experimental measurements of the separating forces made in a small 2-roll mill while rolling polyethylene and plasticized vinyls agreed reasonably well with the computed values. Their method thus provides a sound basis for design of rolls, shafts, and bearings of calenders and mills.

Sheet thermoforming

Automation made an impressive gain in the sheet forming field this year with the announcement of G. E. engineered automatic sheet forming of refrigerator door liners. The sheet travels around a loop conveyor which pauses at four points for loading, heating, forming, and removal. The operator loads and unloads, monitors, and trims the formed product in an adjacent hydraulic press. Heating, drape- and vacuum-forming, and cooling are all done automatically. G. E. reports big savings in capital investment, floor space, and labor, with gains in uniformity of product. It is significant that, as late as 1955, when the production machine was designed, no maker of forming machines was willing to design and manufacture this unit. *See* ***Donald A. Davis,*** **"Automatic sheet forming,"** MODERN PLASTICS *33,* 119 (August 1956).

Two important and somewhat similar developments in sheet forming were reported in 1956. ***J. W. Mighton,*** in **"Plug-assist forming,"** *SPE Journal 12,* 83 (June 1956) reports on a technique in which a wooden plug, loosely filling a female mold, is forced down on a softened sheet that is clamped over the cavity. The air trapped in the female mold is compressed and forces the sheet against the plug. As the plug descends, a sensitive relief valve keeps the trapped-air pressure at the correct value while the warm sheet is rather uniformly stretched along the sides of the plug. In the final step, vacuum is applied to the female mold and the almost-formed sheet is drawn to its finished shape against the chilled cavity walls. The method makes possible the forming of deeper, stronger parts than could be made by simple vacuum or drape-and-vacuum forming.

The second development is the

(*To page* 232)

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MATERIALS FOR TOMORROW

Machines for thermoplastics

The returns of this year's survey of the makers of injection, extrusion, and vacuum forming machines show that 1956 sales to U. S. buyers exceeded those of 1955 by 13, 18, and 29% respectively (see Table I).

Extruders bought more heavily of the bigger machines (see Table II) in 1956 in order to supply the rising demand for thermoformable sheet. In terms of *extrusion capacity*, therefore, 1956 sales show an increase over 1955 considerably greater than 18%, and much of this big-machine capacity must be making sheet. These evidences of growth in the sheet-forming industry are encouraging in view of some reports that the industry is having financial troubles. On the other hand, it is a little disquieting that most of the increase in sales appeared in the smallest class of machines—those having a heating area of 3 sq. ft. or less (see Table III). Doubtless many of these have gone into sound packaging uses, but how many of the rest have become the only machines of small operators who will find the competition too stiff?

In injection machines, the picture *appears* to be reversed (see Table IV): Twenty-three machines in the "over 55-oz." class were shipped, while a big 50% gain was made in the sale of the smallest machines. However, these little fellows are for the most part fully automatic machines with very short dry-cycle times, so their productivity is higher than might be thought from their small shot capacities. In the biggest class, the 10% gain over last year may seem to refute our June surmise (see "Plastics Engineering in the Years Ahead," MODERN PLASTICS *33*, 181, June 1956) that fewer of these large machines would be sold. However they cannot compete with vacuum forming in making the thin, large-area parts of relatively uniform section that initially sparked their development. On the other hand, there will probably be a continuing, if limited, demand for these machines to mold heavy and intricate pieces and pieces of changing cross section.

It is interesting to examine the shifts in the percentages sold of the various sizes of injection molding machines and extruders over the years. Figure 1 presents the data graphically for extrusion machines for the years 1950, '53, and '56, while Fig. 2 represents the picture on injection machines since 1947. The length of a bar in either figure is proportional to the percent of the year's sales in the size class given at the left end of the bar.

In 1947 the 12- and 16-oz. machines were the heavy sellers because molders were really going after what then were considered the bigger pieces and the economy of multi-cavity molding. They are still selling well. Note that while the next size class was relatively well sold that year, the really big machines were not yet in circulation. The year 1947 was a good one for the very small machines, too. In 1950, the "monsters" reached their peak sales (in numbers as well as percentagewise), and deliveries declined over the next six years. Sales of the smallest class, well established and popular in 1947, began to lose ground to the intermediate sizes until this year, when gains in speed and reliable automation have pushed them to a big comeback. The same development has

Table I: Machines in use in U.S.A.

	1950	1951	1952	1953	1954	1955	1956
Injection machines	5983	6251	7015	8204	9181	10,233	11,441
Extrusion machines	2307	2792	3279	3828	4425	5178	6069
Sheet forming machines	—	—	—	—	500	807	1202

Table II: Shipments of extrusion machines

Screw size	*Number of machines shipped* — *Domestic*				*Export*			
in.	*1953*	*1954*	*1955*	*1956*	*1953*	*1954*	*1955*	*1956*
1.7 and less	101	81	106	102	22	20	21	21
1.7+ to 3.2	207	163	268	279	37	24	21	31
3.2+ to 4.2	136	199	207	268	20	28	12	40
4.2+ to 6.5	105	154	160	206	12	18	21	29
over 6.5			12	36			0	7

Table III: Shipments of sheet forming machines

Heater size	*Number of machines shipped* — *Domestic*		*Export*	
sq. ft.	*1955*	*1956*	*1955*	*1956*
3 or less	36	180	—	4
3+ to 6	80	96	—	5
6+ to 12	92	52	—	3
12+ to 18	56	20	—	3
18+ to 30	30	46	—	4
over 30	13	1	—	0
	307	395	0	19

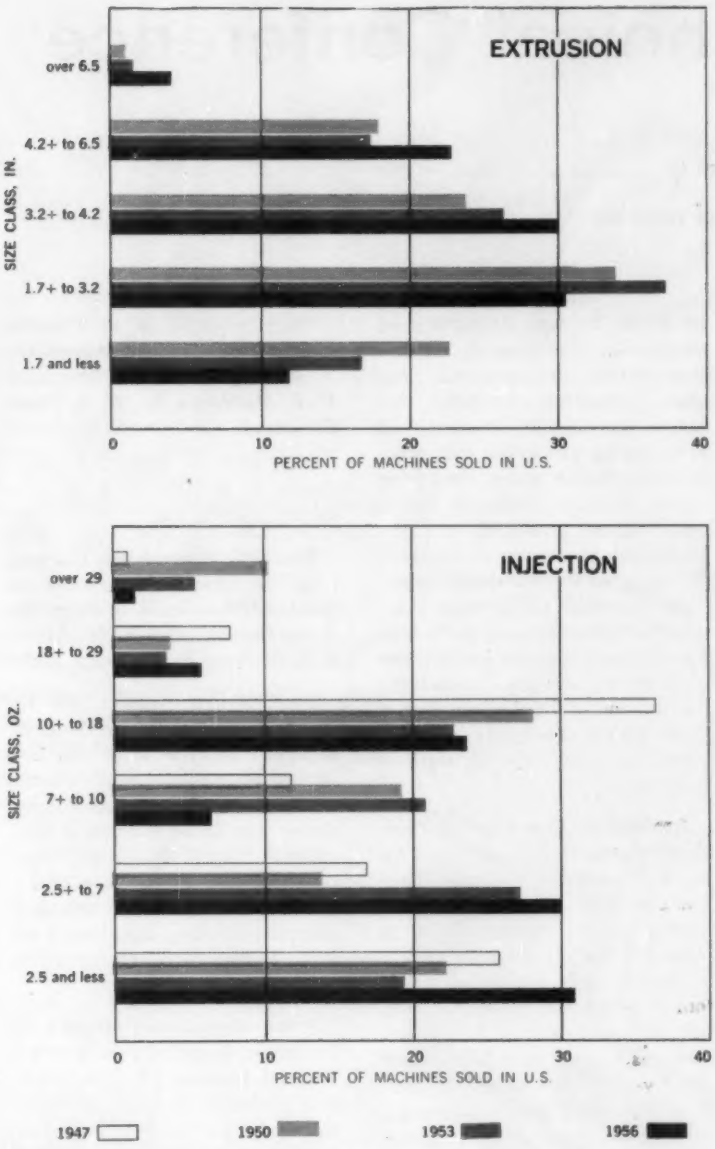


Fig. 1 (top) and Fig. 2: Graphs showing in progressive order the annual percentages of extrusion and injection machines delivered to U.S. processors in the years 1947, '50, '53, and '56.

had its effects in the 2.5+ to 7-oz. class, too.

Unless these big sales have resulted from overbuying, these two smaller size classes should hold a big share of the market in the next year or two. There will probably be a resurgence of the 7+ to 10-oz. class when they, too, are given added speed and reliability of completely automatic operation. Since these percentages must total 100, any gain in one class must be accompanied by a drop in one or more of the others. It can be expected that the two smallest classes will give up perhaps 5 to 10 percentage points over the next few years as the more versatile 7+ to 10-ouncers pick up speed and reliability.

While the industry as a whole thinks in terms of numbers of machines produced, machinery makers, of course, think in dollars of sales. Since price goes up roughly in proportion to shot capacity, anything that can be done to sell a higher percentage of the bigger machines, without reducing the total number sold, will mean many more sales dollars. Aside from improvements in the machines themselves, reductions in costs of molds and improvements in mold design should increase the demand for the bigger sizes.

In extruders, the picture has been steadier, the principal change being the increasing popularity of the larger sizes at the expense of the smaller, particularly the 1.7-in. and less class. It is interesting that the 1.7+ to 3.2-in. class has been the biggest seller over most of the last seven years. The machines in this class combine low enough investment and set-up costs to be practical for relatively short runs with output enough to be useful in long runs, particularly with the smaller-cross-section extrusions —small rod, tubing, wire coating, blown film, etc. The dollars-vs.-volume thinking applies to extruders, too, and it is to the makers' advantage to sell more of the bigger machines. Clearly the prospects of doing so in the next few years depend heavily on the growth of sheet forming.

Table IV: Shipments of injection machines

Capacity	*Number of machines shipped*							
	Domestic				*Export*			
oz.	*1953*	*1954*	*1955*	*1956*	*1953*	*1954*	*1955*	*1956*
2.5 and less	231	306	252	370	33	33	27	42
2.5+ to 7	329	262	351	355	14	25	11	28
7+ to 10	250	115	97	79	42	29	6	4
10+ to 18	274	208	241	286	15	16	11	2
18+ to 29	40	36	68	77	2	0	1	6
29+ to 35	29	15	6	2	1	2	2	1
35+ to 55	21	23	16	16	2	2	3	2
over 55	15	12	21	23	0	1	2	0

S.P.E. Technical Conference

Program and abstracts of papers to be presented at the 13th annual meeting

The Sheraton-Jefferson Hotel in St. Louis will be the site of the 13th annual technical conference of the Society of Plastics Engineers, to be held January 15-17, 1957. Its theme: "Fifteen years of plastics progress." Conferees will register on Tuesday (15th) afternoon, and there will be an informal smoker at 8 p.m. The conference luncheon will be held on Wednesday with the Hon. Raymond Tucker, Mayor of St. Louis, speaking. On Thursday evening there will be a cocktail party and a banquet, at which Joseph Holland of the Pevely Dairy Co. will speak.

The technical sessions are organized as in recent years, with three or four running concurrently each morning and each afternoon. Times and subjects are listed below:

Wednesday morning: Atomic, Design, and Tooling and Machinery.

Wednesday afternoon: Extrusion, Injection Molding, Foams, Education.

Thursday morning: Injection Molding, Extrusion, Applications.

Thursday afternoon: Reinforced Plastics, Instrumentation, Compression Molding, Rheological Research.

Friday morning: Polyethylene, Reinforced Plastics, Epoxies.

The abstracts presented below, in the order listed in the Advance Program, have been adapted from those submitted by the authors. Where no abstract is given, it was not available at press time.

Wednesday morning

SESSION I: ATOMIC; *Moderator, D. Ballantine, Brookhaven Laboratories.*

Some Vital Roles of Plastics in High-Energy Nuclear Research, *by J. O. Turner, University of California.* The pursuit of the anti-proton, the neutrino, and other subatomic particles requires non-metallic materials of very special properties that must operate reliably under very high vacua, gigantic magnetic fields, high voltage gradients, and extremes of temperature. Some of the knottiest nuclear design problems have been solved with plastics. Examples are: acrylic Cerenkov counters, massive polystyrene scintillator blocks, expanded polystyrene and polyester film to hold liquid hydrogen, epoxy-potted magnet coils, as well as many more.

Application of a Flexible Plastic for Contamination Control, *by H. A. Moulthrop, General Electric Co., Mfg. Dept.* Persons operating atomic reactors must be protected against intake of radioactive materials, particularly plutonium which is damaging even in microscopic amounts. Thin, flexible plastic films have been found effective and economical in protecting both personnel and equipment from contaminants. Applications are described, and future needs are discussed. Laminates show promise of higher tear resistance without loss of transparency.

The Permeability of the Polyethylenes to Gases and Vapors, *by V. L. Stannett, State University of New York.* The rates of gas and vapor transmission through polyethylene films are presented and discussed and the characteristics of low- and high-density polyethylenes are compared. The effect of radiation of polyethylene permeability is shown and the behavior of a number of graft copolymers is described, as are the effects of paper substrates.

The Corrosivities of Plastics and Rubbers, *by H. A. Perry, Jr., A. M. Chreitzberg, I. Silver, and H. E. Matthews, Jr., U. S. Naval Ordnance.*

SESSION II: DESIGN; *Moderator, R. B. Akin, E. I. du Pont de Nemours & Co.*

Practical Methods for Controlling the Effect of Moisture on Molded Nylon, *by H. B. Happoldt, A. J. Cheney, and E. M. Lacey, E. I. du Pont de Nemours & Co.*

Plastics—An Answer for Industrial Design, *by R. Hughes, Emerson Electric Mfg. Co.* The history of designing with plastics is reviewed. The industrial designer has found plastics a very versatile family of design materials because of their extreme fabricability. Two tremendous potential markets for plastics are auto bodies and prefabricated homes.

From Appearance Design to Prototype Model, *by E. Ferrari, General Electric Co.* The industrial designer works closely with the model maker, who today has a tremendous range of materials to work with. The application of plastics to the techniques of producing design and prototype models is discussed at length. High points: casting resins, plastic tooling, metallizing by silvering and electro-plating, forming and fabrication of plastic parts, plastic master models for production tooling.

Can Performance Tests be Developed for Finished Molded Articles, *by R. A. McCarthy, Monsanto Chemical Co.*

SESSION III: TOOLING AND MACHINERY; *Moderator, I. Thomas, Newark Die Co.*

Continuous Winding Machin-

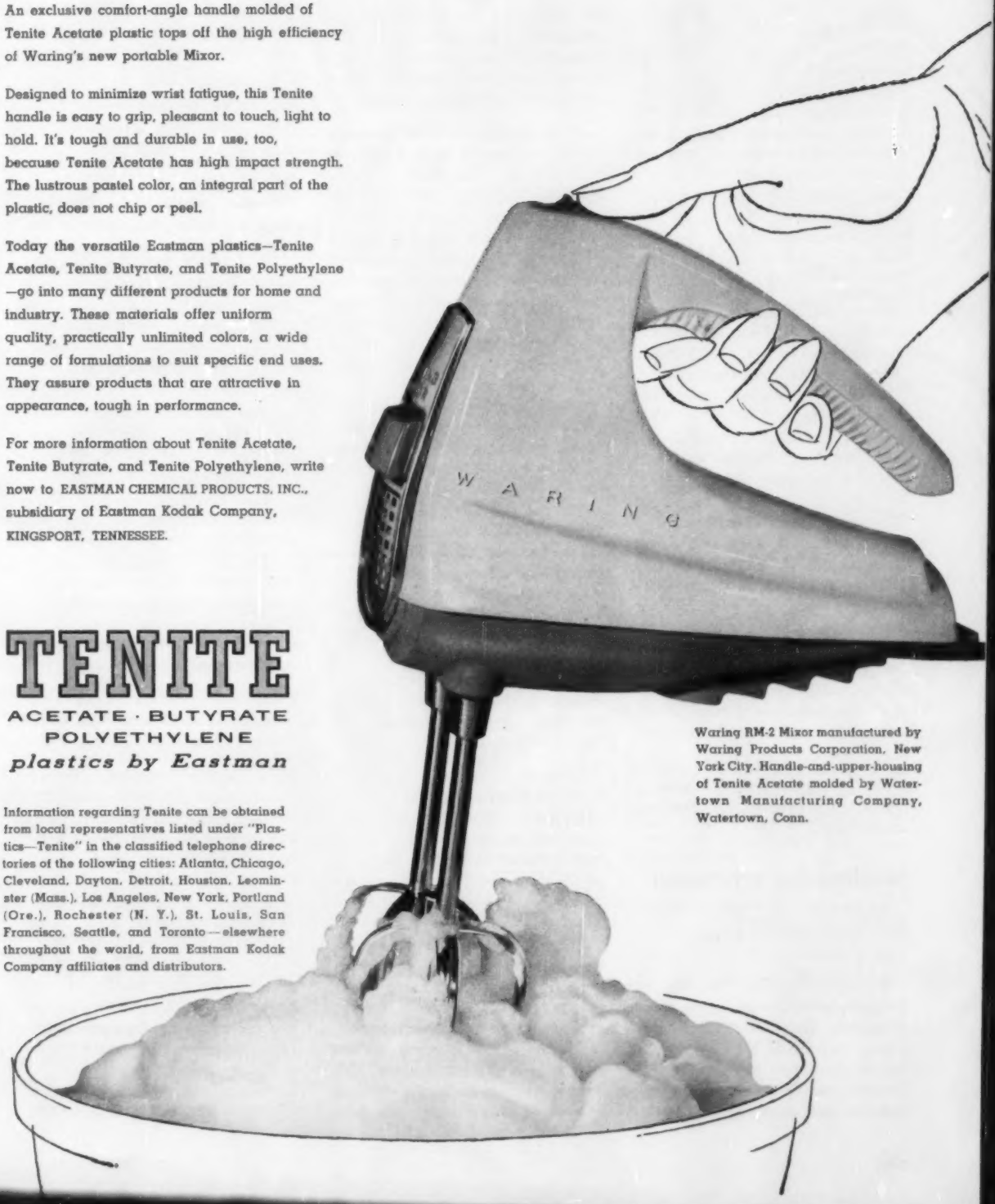
handled with ease

An exclusive comfort-angle handle molded of Tenite Acetate plastic tops off the high efficiency of Waring's new portable Mixor.

Designed to minimize wrist fatigue, this Tenite handle is easy to grip, pleasant to touch, light to hold. It's tough and durable in use, too, because Tenite Acetate has high impact strength. The lustrous pastel color, an integral part of the plastic, does not chip or peel.

Today the versatile Eastman plastics—Tenite Acetate, Tenite Butyrate, and Tenite Polyethylene—go into many different products for home and industry. These materials offer uniform quality, practically unlimited colors, a wide range of formulations to suit specific end uses. They assure products that are attractive in appearance, tough in performance.

For more information about Tenite Acetate, Tenite Butyrate, and Tenite Polyethylene, write now to EASTMAN CHEMICAL PRODUCTS, INC., subsidiary of Eastman Kodak Company, KINGSPORT, TENNESSEE.



Waring RM-2 Mixor manufactured by Waring Products Corporation, New York City. Handle-and-upper-housing of Tenite Acetate molded by Watertown Manufacturing Company, Watertown, Conn.

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ery for Plastic Film and Sheeting, *by J. E. Nordgren, The Black-Clawson Co., Inc.*

The Importance of Mold Rigidity in Injection Molding, *by R. N. Farris, The Dow Chemical Co.* The acceptance of plastics as engineering materials has emphasized the importance of tight dimensional tolerances, larger-area parts, faster cycles, and thinner sections. To meet these requirements, rigid molds are needed. Emphasis is placed on materials and design devices used to get increased rigidity in molds. Metals are compared in yield strength, bearing properties, and heat-transfer characteristics. Locating devices are analyzed with reference to the effect of operating conditions (e.g., blowing of the mold) on each design. Suggestions are made for coping with future mold design demands.

Materials, Tooling, and Machines for Injection Molded Packaging, *by B. Nathanson, Monsanto Chemical Co.* Injection molded, thin-walled containers can compete with other packaging only if the costs of machines, molds, and material are kept low. Problems in molding containers include: 1) building molds to withstand the high molding pressures used, 2) reducing down time on molds, 3) building machines that can perform constantly at high rates, 4) getting the needed plasticating capacity, 5) getting plastics that will have both good flow and good strength. Considerable progress on these problems has already been made, but much more needs to be done.

The Engineering of Molds Utilizing Electroformed Cavities, *by W. J. B. Stokes, III, Electromold Corp.*

Wednesday afternoon

SESSION I: EXTRUSION (I); *Moderator, C. Young, Crescent Plastics.*

Factors Affecting Quality in Polyethylene Extrusions, *by B. H. Maddock, Bakelite Co.* In this paper, extrudate quality is discussed from two points of view: dimensional uniformity and mechanical homogeneity. Optimum pressure conditions are shown to exist for a given screw and extruded product, and a method of quality control by control of the pressure variable is described. In general, extrusion quality is shown to be affected adversely by an increase in extrusion rate, a decrease in stock temperature, or a decrease in mechanical work. The ability of the machine to maintain the last two of these variables at satisfactory levels determines the ultimate output capacity of the system. The ratio of mechanical to conducted heat input is also of significance.

Flow of Polyethylene Through Circular Dies, *by D. I. Marshall, Bakelite Co.* The flow of polyethylene through circular die cross sections has been studied using various die sizes and shapes of approaches. It was found that dies with streamlined approaches pass material at up to ten times higher rates without roughness, compared with dies having square-cut entrances. The change in flow rate with temperature at high shearing stresses differed from the temperature effects found by Philippoff using a rotating-cup viscometer. It is therefore suggested that predictions of pressure drops through dies of all types be based on capillary flow measurements rather than on rotating cup values.

A simple empirical method by which pressure drops through circular orifices and tubular passages of any length can be calculated uses a second term in the Poiseuille equation to account for the end correction and delayed elastic properties.

Valved Extrusion, *by E. C. Bernhardt, E. I. du Pont de Nemours & Co.* This paper describes plug valves and needle valves which have been developed for application on polymer melts. Methods for estimating the resistance to flow through various valve channels and manifolds are discussed.

In a novel technique a valve has been used to block the extruder output intermittently, while the extruder screw continued to turn at normal speed. This procedure results in the ejection of a rapid series of separate shots of uniform weight from the extruder. Applications of such extrusion methods in combination with simple forming operations appear to offer new solutions to a variety of plastics processing problems.

The effect of the use of valves on the optimum screw design for extruders is considered and a sample calculation is illustrated.

Effect of Blow-up Ratio on Blown Polyethylene Film Properties, *Spencer Chemical Co.*

SESSION II: INJECTION MOLDING (I); *Moderator, L. F. Rahm, Princeton University.*

The Molding of Linear-Type Polyethylene, *by J. W. Flynn, Celanese Corp. of America.* Data are presented showing the effect of gating on the physical properties of injection molded linear polyethylene. The impact strength and the shrinkage of the piece vary over a wide range depending on the size of the gate. Other physical characteristics do not. Due to the flow and shrinkage characteristics of the material, the location, type, and size of the gate appear to have a controlling effect on the warpage of the molded piece. Although many standard molded articles that are symmetrical in shape may be molded with a single gate, some may require multiple gating to prevent distortion, especially articles that are unsymmetrical in shape or have a large variation in wall thickness.

Injection Speed Considerations, *by L. E. Tallman and O. G. Maxson, The Dow Chemical Co.*

Uniformity Considerations for Plastic Stock Temperature in Injection Molding, *by A. L. Bird and J. Eveland, The Dow Chemical Co., Plastics Tech. Serv.* Non-uniform plastic stock temperatures are directly or indirectly responsible for silver streaking, burning, non-uniform cycles, poor or obvious weld lines, crazing, and low heat distortion temperatures. Improvements in heating cylinder design and instrumentation have been rapid and very encouraging.

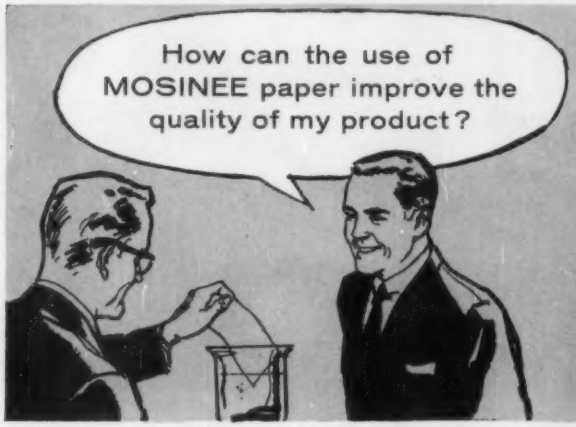
Heating the plastic in a thin

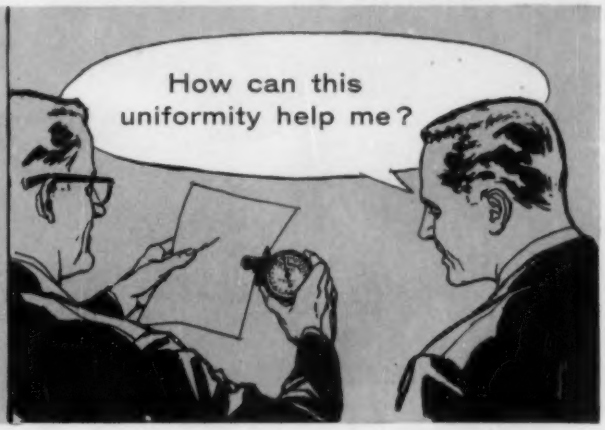
(*To page* 235)

A plastics processor learns the profit story about special-purpose papers



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*Maraset is the new registered trade mark for the Marblette line of superior epoxy resins for casting, laminating, potting, trowelling, sealing, and other uses. These are resins maintaining the high standards of quality and performance set by liquid and cast phenolic resins supplied by Marblette since 1929.

Plastics* Technical Section

Dr. Gordon M. Kline, Technical Editor

The year 1956 in review

Following the 1955 record-breaking production of plastics (1)[1] and plasticizers (2), the year 1956 has been characterized by a consolidation of market gains and a close examination of future trends in market factors (3), materials (4), processes (5), applications (6), and international trade (7-20). The 7th National Plastics Exposition held in New York in June 1956 displayed new developments in materials, machinery, and applications to over 28,000 visitors, 1200 from foreign countries. Particular emphasis was noted in composite structures, large moldings, decorative applications, and automation (21).

New resins

Methylstyrenes: The monomer for this new series of polymers (Cymac resins, American Cynamid Co.) is made from toluene and acetylene. Polymethylstyrene is available at the same price as polystyrene, but has higher heat resistance. Moldings may be repeatedly heated in boiling water with ultimate shrinkage of only 0.3 percent. The copolymer of methylstyrene with 30% acrylonitrile has markedly higher resistance to heat, crazing, abrasion, impact, and chemicals. It is available at 41¢ per lb. and is suggested for fan blades, battery cases, radio cabinets, and pen barrels. Methylstyrene is envisaged as suitable for broad utility in resins for surface coatings, reinforced plastics, and textile and paper treatments (22).

Chlorinated polyether: This new resin (Penton, Hercules Powder Co.) is based on pentaerythritol and is in the pilot plant developmental stage. It contains approximately 45.5% chlorine and has the following chemical structure: $[-CH_2C(CH_2Cl)_2CH_2O-]_n$. It combines good moldability into strain-free close-tolerance parts with unusual dimensional stability, good chemical resistance, negligible water absorption, good dielectric characteristics maintained under adverse conditions, and 3000 p.s.i. tensile strength in boiling water. Its heat distortion point is 185° F. at 264 p.s.i. and 300° F. at 66 p.s.i. Its specific gravity is 1.4. It is expected to be used in fluid meter gears and bearings, chemical valves, business machine parts requiring high dimensional stability, electrical insulation, refrigerator parts, low permeability films, and other applications in which chlorofluorocarbons are now used (23).

Polyolefins

The announcements in 1955 of the new high-modulus polyethylenes made by the Phillips and Ziegler processes have been followed in 1956 by major developments in this field by all the leading producers of polyethylene. These new products are characterized by higher heat resistance, greater stiffness, less permeability, better clarity, and greater tensile strength. These properties result from the more linear molecular structure and greater crystallinity of the new polyethylenes. Densities of the new materials range from 0.92 to 0.96 and are available from either low or high pressure polymerization (24, 25).

As emphasized in last year's review, there are other broader and highly significant commercial developments yet to come by the application of solid catalyst polymerization to other olefins and vinyl derivatives. The principles of stereospecific catalysis and its practical applications in the production of isotactic polymers were set forth in a noteworthy paper (26). Great interest in particular is attached to polypropylene (27-30) whose properties are claimed to exceed in many ways those of polyethylene. The strength of polypropylene fibers was reported to be 7 g./denier, corresponding to a yield strength of 70 kg./mm.^{2} and equalling that of steel, although the density (0.92) is one-eighth that of iron. The same author reported the comparative properties of isotactic and atactic polymers produced from butenes, pentenes, and styrene, showing further the advantages imparted to these polymers by stereospecific duction of this polymer (34, 35).

The synthesis and properties of cis-1,4-polyisoprene, made by stereospecific polymerization, were reported; this marks the first production synthetically of a polymer duplicating the molecular structure of natural rubber. Plants are being erected by several firms for the commercial production of this polymer (34, 35).

Isocyanate polymers

The research activity and commercial interest in this relative

*Reg. U. S. Pat. Off.
[1]Numbers in parentheses link to list of references starting on p. 166.

newcomer to the plastics field were indicated in two major symposia on the subject. One sponsored by the American Chemical Society in September consisted of 23 papers from eleven laboratories; they dealt principally with the chemistry of the reactions of isocyanates with other compounds to form resins and elastomers (36). The second symposium, sponsored by the Society of Plastics Engineers in October comprised 7 papers from six firms; these described materials and processes employed in the production of adhesives, coatings, foams, and rubbers from isocyanates. The prediction is made that cheap aliphatic diisocyanates, which also have greater light stability, will be available in the near future from petrochemical sources to supplement the aromatic diisocyanates now commercially available. The following figures on United States patents relating to polyisocyanates issued from 1944 to October 1956 were presented to indicate the widespread effort in this field: American Cynamid 4, Bayer 9, Celanese 3, Du Pont 17, Goodrich 4, Goodyear 10, Lockheed 7, Monsanto 3, Rohm and Haas 5, Wingfoot 8, and others 12 (37).

Articles published during the year described the preparation, properties, and applications of isocyanate products in electronics, surface coatings, wire coverings, and rubberlike products (38-47).

Epoxy resins

Continuing growth and diversification in the applications of epoxy resins were reflected in numerous reports describing their use in potting compounds (49), tooling (50), piping (51, 52), coatings (53), adhesives (54), plasticizers (55), electrical insulation (56), and reinforced plastic parts (57). Technological developments in materials included products formed by the reaction of epoxy compounds with polyamides (58), ethers (59), sulfonamides (60), polysulfides (61, 62), and other chemicals (63, 64).

A symposium of 18 papers at the September meeting of the American Chemical Society highlighted recent advances in epoxy resins (65). Of special note was a paper presenting the results of extensive plant evaluation tests of epoxy resins in combatting corrosion. Fourteen case histories were reported, dealing with epoxy resins reinforced with glass or polymeric fibers, casting materials, adhesives, caulking compounds, protective coatings, and repairs to equipment, pipelines, a distillation tower, and a leaking steam chest. Substantial cost savings were achieved in the use of reinforced epoxies in exhaust stacks, storage tanks, product carriers, structural angles, and filter frames (66).



School seat is upholstered with foamed vinyl pad. (Photo, Brown Rubber)

Radiation effects

The effects of nuclear radiation on polymeric materials continued to be investigated in many laboratories (67-73). Specific reports dealt with polyethylene (74, 75), silicones (76, 77), polyisobutylene (78), styrene copolymerized with isobutylene (79), and polymethyl methacrylate (80). The uses of plastics in atomic installations were reviewed (81).

A new section was organized in A.S.T.M. Committee D-20 on Plastics to develop standard methods of irradiation and testing to determine the effects of nuclear and high-energy radiation on the physical and chemical properties of plastics. The chairman of the new group is D. S. Ballantine of Brookhaven National Laboratories who has been working for several years studying the effects of nuclear radiation on plastics.

Other materials

Acrylics: Lower costs and superior weathering properties are important factors in the steady growth in markets for these resins. One forecast predicted a 150% increase in sales for the period 1955-1960, based on surface coating applications and outdoor uses for molded or formed parts (4). Acrylonitrile resins are also destined to forge ahead, particularly in synthetic fibers (82).

The commercial production of biaxially stretched polymethyl methacrylate sheet for use in the canopy enclosures of the TF-102A jet interceptor was announced. The cast acrylic sheet is first stretched and is then formed and fabricated into parts without significant reduction in the toughness of the stretched sheet (83). Further data on the properties of stretched acrylics were published by the National Bureau of Standards which originally demonstrated that the marked improvement in crazing and impact resistance imparted to acrylic sheet can be employed to advantage in aircraft glazing (84). Other reports dealt with equipment for stretching and the properties of 100% stretched polymethyl methacrylate (85-88).

The use of acrylics for outdoor advertising displays and signs gained impetus with the production of extruded panels 14 ft. long, 50 in. wide, and ⅛ in. thick (89). Panels press molded of a modified acrylic resin reinforced with glass fiber are available for industrial glazing (90). Acrylic sheets extruded with tongue-and-groove edges and assembled with nylon rivets serve as the walls of a telephone micro-wave relay station 120 ft. long and 40 ft. wide (91). The uses of acrylics in street lighting were reviewed (92, 93).

The dynamic mechanical properties of acrylic polymers were emphasized in physical studies (94-97). Comprehensive investigations were made of the accelerating effect of amines and sulfinic acid derivatives on the

polymerization of methyl methacrylate (98, 99).

Other reports dealt with the polymerization of acrylonitrile (100-102) and alkyl thioacrylates (103).

Cellulosics: Cellulose triacetate, introduced commercially for movie film a few years ago, is now in large scale use for records distributed as premiums; more than 2 million records per week are turned out on film as thin as 3 mils (104). Extruded acetate sheet, free of objectionable shrinkage and warpage from loss of solvent, and incorporating special decorative effects, now accounts for about 20% of the spectacle frame market; this growth is expected to continue because of lower costs of the extruded acetate frames compared to those based on nitrate stock (105). New developments were reported in cellulose propionate molding compounds (106), polymer-coated cellophane (107), weather-resistant ethyl cellulose compositions (108), flame-proofing of cellulose ester films (109), butyrate in pipe (110) and in coatings (111) and film (112) for application to paper, and electrical insulating tape made of cellulose triacetate and polyethylene terephthalate (113). The creep behavior of cellulose acetate (114) and thermal degradation of cellulose (115) were among the studies of cellulosics made by various investigators (116, 117).

Ethylene polymers: The literature on polyethylene (24, 25, 118-123) kept pace with the fast-moving commercial developments which have seen this polymer undergo a ten-fold growth from 1950 to 1955 and now apparently destined for first place among plastics by 1960. Three important papers described the catalyst system (124), structure (125), and properties (126) of the high-modulus polyethylene made by the new Phillips low-pressure process.

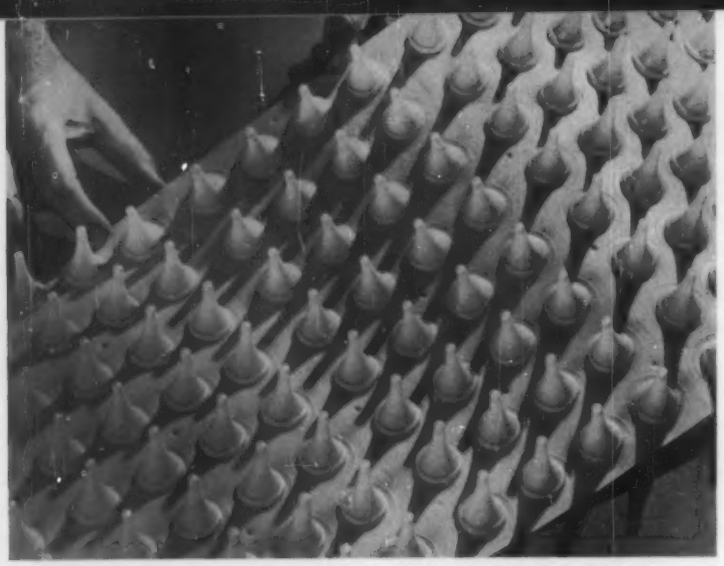
King-size moldings in polyethylene houseware items are expected to expand consumption in this field alone to an annual rate of 100 million lb. by the end of 1956. Largest item now is a 22-gal. trashcan weighing seven pounds. Other applications include buckets, garbage pails, dish pans, baby baths, and laundry baskets (127). Another potential 100 million lb. market for polyethylene is foreseen in the use of film for agricultural purposes, including construction of low-cost greenhouses, mulching and covers for tomatoes, strawberries, and other plants, and watertight tarpaulins for lining irrigation and stock-watering ponds (128). Polyethylene film vapor barriers under floors and roofing and in concrete highway construction are other outlets that are pushing this plastic rapidly toward a 1 billion pound annual consumption (4). The new high-modulus polyethylenes are expected to open up new markets in textiles and ropes because of price and property advantages compared to saran and nylon monofilaments (129-131). Other developments in polyethylene uses pertained to packaging (132, 133), bottles (134), coatings for drums (135), polishes (136), batteries (137), domestic ware (138), protection of rice in storage (139) and fumigation of grain storage areas (140).

Problems involved in extruding (141, 142), injection molding (143), vacuum forming (144), printing (145), bonding (146), and heat sealing (147) polyethylene were described. Methods were reported for determination of molecular weight (148-151), oxidative degradation (152, 153), second-order transition temperatures (154), methyl content (155), and film toughness (156) of polyethylene. Among the physical properties investigated were tensile behavior (157), compressibility (158), viscoelastic characteristics (159), and scattering of light from film (160).

Fluorocarbons: Baked-on fluorocarbon coating materials are now available from six firms for use in protecting chemical equipment, magnet wire, bakery equipment, medical instruments, and the like. Undergoing development are homogeneous mixtures with corrosion and heat-resistant epoxy resins and the copolymerization of perfluoroethylene and propylene (161, 162). Treatment of Teflon in a bath containing metallic sodium and anhydrous ammonia yields a surface to which other materials can be bonded (163-165). The excellent frictional, chemical, and wear properties of fluorocarbon plastics are combined with the strength, thermal conductivity, and dimensional stability of metals by impregnation of a porous metal matrix; the maximum use temperature for these dry bearings is about 600° F. (166-168). Teflon reinforced with inorganic fibers is reported to have excellent resistance to cold flow and to distortion at high temperatures (169). Addition of naphtha or white oil to finely powdered Teflon permits ram-type extrusion of thin-wall (0.01 to 0.1 in.) tubing and coatings on wire; the extrusion aid is vaporized before sintering the resin (170). Frictional coefficients (171), thermal

Smooth surface of tough polyester film conveyor belt for candies provides glossy finish for chocolate coatings. (Photo, Du Pont)





Disposable coverings for otoscope (an instrument for examining ears) are formed continuously from vinyl sheet. (Photo, Plaxall)

expansion (172), thermal decomposition (173), and mechanical strength (174, 175) were among the properties of fluorocarbons reported upon in the literature (176-178).

Phenolics: Advances in molding phenolics include faster curing materials, faster machines, and increasing automation. Curing times can be cut in half by using higher pressures with very stiff material.

Automatic molding-in of inserts has been accomplished (179). One of the biggest compression moldings yet made is a 285 lb., intricately contoured filter plate used in filtering pigments; the plates are 24 sq. ft. in area and are molded of asbestos-filled phenolic. Single pieces weighing up to 4 tons, such as tanks and stack sections, are preformed and cured in an autoclave (180). It was demonstrated that melting, grindability, viscosity, caking time, and flow point of phenolic resins are related to water content, monomer conversion, and stroke cure which can be predicted from process cycle conditions (181). Many chemical studies of the phenol-formaldehyde reaction (182-185) and degree of cure of the resins (186) were reported (187, 188).

Polyamides: It is estimated that the amount of nylon resins used in non-textile applications will grow from the present 25 million lb. figure to 50 million lb. by 1960 (4). Nylon-6 based on caprolactam permits production of parts having large surface area and thick cross sections in competition with metals; high-melt-viscosity nylon-6 resins are available for making pipe, film, and bottles (189, 190). The new nylon-11 based on amino-undecanoic acid is finding uses in electrical insulation and machine parts where its low water absorption imparts good electrical properties and dimensional stability over a wide humidity range (191). Another potential nylon-type resin for the trade is foreseen in the polyoxamides (192). Nylon bottles (193), machinery drive-belts (194), window channel strip (195), and bellows in an explosion suppression device (196) are among the new uses reported. The properties of diverse types of nylons were described (197-201). A characterization scheme for small-scale evaluation of fiber-forming polymers such as copolyamides was outlined (202).

Polyesters: Molding compounds made up of short chopped strands of glass, sisal, asbestos, or a synthetic resin fiber and polyester binder have found important new markets in the past 3 years. Largest volume is going into automotive parts, such as air-conditioning and heater ducts and housings, door panels, and side seat shields. Other applications include electrical appliance parts, tool handles, machine housings, tote boxes, and shipping containers (203-209). The production of polyesters for molding compounds in 1955 was 7 million lb. and for mat and fabric reinforced products 52 million lb.; these markets are expected to increase by 1960 to a total of well over 100 million lb. (4, 203).

Many articles were published on the processing of polyesters, including storage and handling (210), polymerization (211-213), and control of degree of cure (214-216). The properties of a series of polyesters prepared from maleic anhydride, triethylene glycol, and styrene were correlated with chemical composition (217). Studies were reported of molecular properties of various polyesters (218-223).

Polyester film (Mylar, E. I. du Pont de Nemours and Co., Inc.) has interesting possibilities for future growth; the 5 million lb. sales figure for 1955 is expected to go to 15 million lb. in 1960 or higher if the price drops significantly (4). Important present uses in packaging include bags in which frozen foods can be heated for use (224) and pouches for aerosols (225); polyethylene-coated Mylar has potential use in packages for irradiated foods (4, 226, 227). Belting prepared by lamination of two 3-mil-thick Mylar films is strong enough without fabric support to perform effectively for conveying foods, candy, and bakery products; it is 1/12 as heavy as the lightest conventional woven belting, thereby reducing power requirements (228). Adhesives for bonding polyethylene terephthalate fibers were described (229).

Silicones: Alloys of silicone polymers with other plastics, such as vinyl resins, polyethers, and polyethylene, have been developed to provide dielectric materials for use where repeated immersion to substantial depths in sea water, followed by exposure to wind and sun, is experienced. The new alloys are tough, resistant to high temperatures, dimensionally stable, and can be readily molded and extruded. They are used for antenna domes, support insulators, fairing sections, and other submarine parts, as well as for refrigerator breaker strips and electrical connectors

Are you measuring all the muscles in your base fabrics?

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(230). Problems involved in the fabrication and uses of silicones in reinforced plastics (231-233) and elastomeric products (234-236) were reviewed. Other investigators reported on polymerization studies (237-240), elasticity (241), and determination of silicones in waterproofed textiles (242).

Styrene polymers and copolymers: Biaxially oriented polystyrene sheet 10 mils thick has proved to be eminently suitable for the manufacture of printed transparent closures for food containers. A special machine was developed for forming the sheet at 300° F. while it is clamped to avoid loss of orientation by plastic recovery (243). Protective coatings based on acrylic resins have been found to impart good weathering properties to polystyrene molded parts whose specific gravity and low cost per pound make them attractive costwise for outdoor uses (244). Other authors dealt with manufacturing problems (245, 246), polymerization of styrene (247-249) and trifluorostyrene (250), and properties of oriented polystyrene monofilaments (251).

The durability of modified polystyrenes was determined in 3 year tests involving 1) storage at 160° F. and 2) exposure outdoors. A styrene-acrylonitrile copolymer modified with butadiene-acrylonitrile rubber had greater resistance to change in toughness, flexural strength, and stiffness after exposure than any of the mechanical mixtures of polystyrene and butadiene-styrene rubbers that were tested (252). Commercial development of a technique for decorating styrene alloy sheet by lamination with a reverse-printed overlay was announced. Oriented styrene and polyester films are applied to the styrene sheet as it emerges from the extruder and in some installations the decorated sheet is immediately vacuum formed (253). The compounding and processing of styrene copolymers and alloys were discussed by several authors (254-258). Applications described include shoe soles (259), luggage (260), battery cases (261), and housings for motion picture projectors (262) and portable coin sorters (263).

Vinyl polymers and copolymers: The vinyls continue to hold the top position in production, with 700 million lb. produced in 1955 and a figure of 1200 million lb. predicted for 1960 (4). A large number of reports described developments in materials (264-270) and processes (271-276). Viscosity-temperature relationships in plastisols were charted to assist in selection of ingredients and operating conditions for hot spraying operations (277). Fire resistance (278), glass transitions (279), and degradation (280) of polyvinyl chlorides were studied. Based on oxygen-aging and oven-aging tests at 212° F., 0.02 part of bisphenol-A to 100 parts resin markedly improved physical and color stability of polyvinyl chloride compounds plasticized with isooctyl and decyl phthalates manufactured by the Oxo process (281). Other reports dealt with plasticizers (282), stabilizers (283), viscosity depressants (284), and fillers (285) for polyvinyl chloride compounds.

Vinyl pipe has been installed on 24 Navy ships to provide a washdown system to remove radioactive fallout particles with seawater; the plastic pipe offers significant weight savings over aluminum and steel, and is easier to install, requiring only socket type cemented fittings (286). Extruded vinyl tubing has proved ideal to move water from source to crop, eliminating water loss through seepage and evaporation; over 1 million ft. are now in use on western farms (287). Vinyl film is now being cast on paper carriers and, where desired, laminated to fabric in a single operation (288). Many other developments in vinyl applications were reported (289-294).



Lacy pattern is applied to styrene sheet through use of reverse-printed overlay. (Photo, Campco Div.)

New information was published on vinyl epoxystearate (295), perfluoro vinyl (296), vinylpyridine (297), vinyl acetate (298), and vinylidene cyanide (299) polymers. The British Standards Institution promulgated a new standard for polyvinyl chloride sheet (300).

Other polymers: Growth in production and use of urea and melamine resins is expected to go from about 325 million lb. in 1955 to about 400 million lb. in 1960 (4, 301-304). Ion exchange resins are performing vital roles in the atomic energy program, from recovery and purification of uranium to analysis of fission products contained in radioactive fall-out after a nuclear bomb explosion (305).

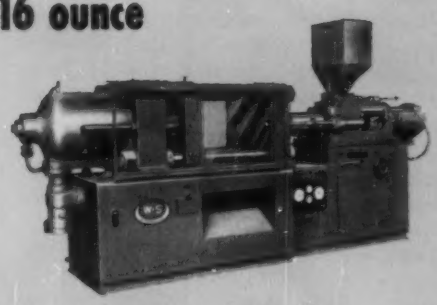
Acrylate rubbers for lubricating systems (306), alkyd-rubber sealers for castings (307), and silicone rubbers for electrical insulation and packaging uses (234) were among the elastomeric products covered in the literature (44-47, 308-311). Durability testing (312) and time-temperature effects on deformation (313) of asphalts were investigated.

Polymerization operations (314-318) and heterogeneous catalysis (319) were reviewed. Special polymers described include those containing glycidyl ether (320, 321), aroyloxy radicals (322), aromatics (323), and graft components (324). A phosphonium chloride compound forms fire-resistant polymers and imparts flame resistance to amino and phenolic resins (325).

Reinforced plastics: Giant parts continue to mark the march of progress in the industrial utilization of reinforced plastics. New combinations of materials, new molding methods, and new designs are helping truck operators to reduce operating and maintenance costs, boost payloads, and provide superior insulation for products requiring refrigeration (326). Improved production methods developed in the course

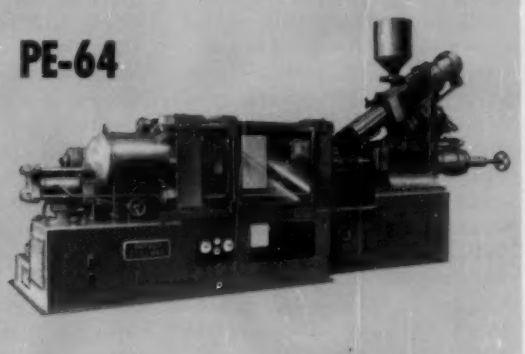
Does one of these
THREE NEW MOLDING MACHINES
meet your needs?

16 ounce



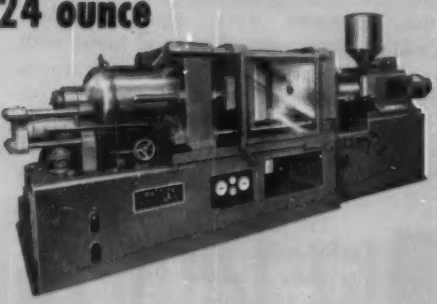
Maximum ounces per shot (Styrene).....16
Plasticizing capacity per hour.....150 lbs.
Maximum die sizes.....20" x 36" x 21" x 33"
(Ask for bulletin 622)

PE-64



Maximum ounces per shot (Styrene).....90
Plasticizing capacity per hour.....285 lbs.
Maximum die sizes.....27" x 45" x 25" x 40½"
(Ask for bulletin 624)

24 ounce



Maximum ounces per shot (Styrene).....24
Plasticizing capacity per hour.....250 lbs.
Maximum die sizes.....27" x 45" x 25" x 40½"
(Ask for bulletin 623)

The three injection molding machines illustrated are recent additions to the Watson-Stillman "Completeline" of plastics equipment. Incorporating all the latest operating features, they reflect the continuing contributions being made by Watson-Stillman toward higher molding speed and accuracy.

In the market for molding machinery? There's no need to "shop around." At Watson-Stillman you can be sure of getting the performance you need. You choose from one of industry's most complete, most diversified lines. Horizontal injection molding machines range from 5 to 500 ounce capacities.

Ask for bulletin on any of the machines described.

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WS-21

of manufacturing over 8000 bathtubs are now available for molding garage doors, boats, and automobile bodies (327). Droppable jet-plane fuel tanks made of reinforced plastics have a 225-gal. capacity, are 15 ft. in length, and weigh 115 lb.; these tanks are potential replacements for those made of aluminum which becomes scarce in wartime and can be salvaged and re-used by the enemy (328). Helical reinforced plastic springs made with epoxy resin and glass filaments had torsional moduli of rigidity of the order of 1×10^6 p.si. and good recoverable energy properties after 30 days loading (329, 330). Other newsworthy uses of reinforced plastics pertained to toilet bowls (331), school desks (332), boats (333), car bodies (334, 335), chemical laboratory and plant equipment (336, 337), printed circuits (338, 339), telephone unit covers (340), pipe (341), packaging (342), and heating equipment (343).

New developments were reported in materials (344-353), and processes for molding, fabricating, and inspecting reinforced plastics (354-363). Prestressing of the glass fibers in reinforced plastics was found to increase flexural strength up to 50% and wet strength retention up to 30% (364). In a study of the mechanism of plastics reinforcement in tension, it was shown that adhesion between resins and fibers only influences the properties of the laminate before it is preloaded (365). Important new information was obtained on the dielectric breakdown (366) and thermal properties of reinforced plastics, including specific heat, thermal conductivity and expansion (367).

Foamed plastics: There were many reviews of developments in this rapidly expanding sector of the plastics industry (368-372), especially concerning new methods of production and applications of vinyl (373-378), polyurethane (43), and styrene (379-383) foams. One authoritative source foresees the growth of the polyurethane and vinyl foam industries from their 1955 sales level of about 5 million lb. each to about 150 million lb. each by 1960 (4, 384). The market potential includes automotive and upholstery cushioning, sportswear, insulated clothing, footwear, fashion accessories, mattress pads, sponges, packaging, toys, thermal and sound insulation, vehicle padding, and industrial filters and gaskets. The development of testing methods and standards for foamed plastics assumes great importance in view of this projected expansion of the industry, and the American Society for Testing Materials and the Society of the Plastics Industry have committees working on these problems. One important contribution presented compression-indentation, compression set, flammability, and fatigue data on vinyl, urethane, and rubber foams; it was observed that "cure" or "fusion" is a vital factor in the quality of the finished product and several test procedures for evaluating this property were explored (385).

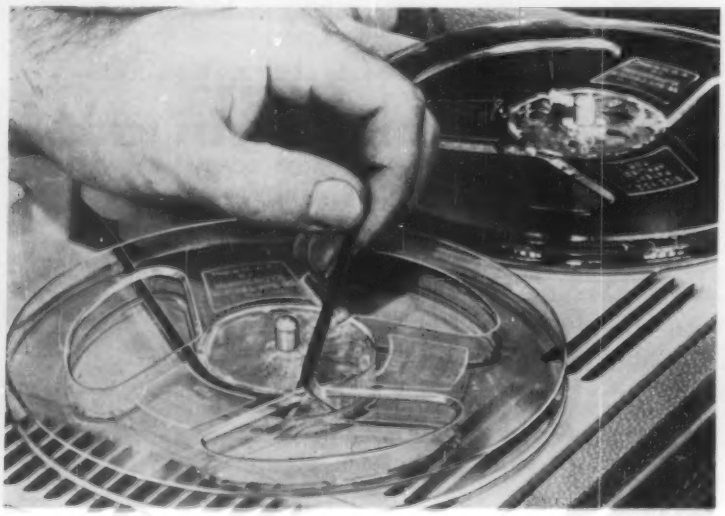
Sandwich structures continue to find new uses where lightness in weight introduces installation or mobility advantages. A new model refrigerator has a cabinet constructed of a sandwich panel made up of a glass-polyester exterior face, styrene foam core, and styrene alloy interior face (386). New curtain wall panels for building construction consist of a sandwich of glass-polyester skins and foamed styrene core (387). Balsa wood is also finding application as a core material in combination with reinforced plastic faces for the construction of tank trailers, lightweight ladders, pleasure craft, and airplane parts (388).

Fillers, plasticizers, etc.: The synthetic fibers are invading the fields of laminates and molding compounds and introduce new variables to be evaluated by the user (389-393). These fibers that have joined glass, asbestos, and sisal as plastic reinforcements include polyester (Dacron), acrylic (Orlon, Acrilan, and Dynel), nylon, rayon, acetate (Arnel, Fortisan), and polytetrafluoroethylene (Teflon). New developments in asbestos reinforcements in the form of felts, mats, and papers were reported (350). Treatment of mineral fillers with surface-active agents improves densification and strength of highly filled plastic compositions (394). The selection and processing of color pigments for plastics were discussed (395).

The production of plasticizers in 1955 approximated 400 million lb., a gain of about 100 million lb. over 1954; about 175 million lb. went into plastics based on vinyl chloride polymers and copolymers (2). A test for measuring volatile loss during milling of a plasticized vinyl compound was described. No significant weight losses were found for 4-mil films prepared with commonly used ester-type plasticizers and suspended 2½ years in a laboratory (396). New data were published on the properties of various plasticizers (55, 397-399) and stabilizers (55, 283);

(*To page* 161)

Molded styrene reel facilitates threading of coated acetate or polyester magnetic recording tape. (Photo, Minnesota Mining & Mfg.)





Electric typewriter keys molded from BAKELITE Brand C-11 Plastics. See next page for details.

Plastics selection is faster with the

Greatest variety at one source

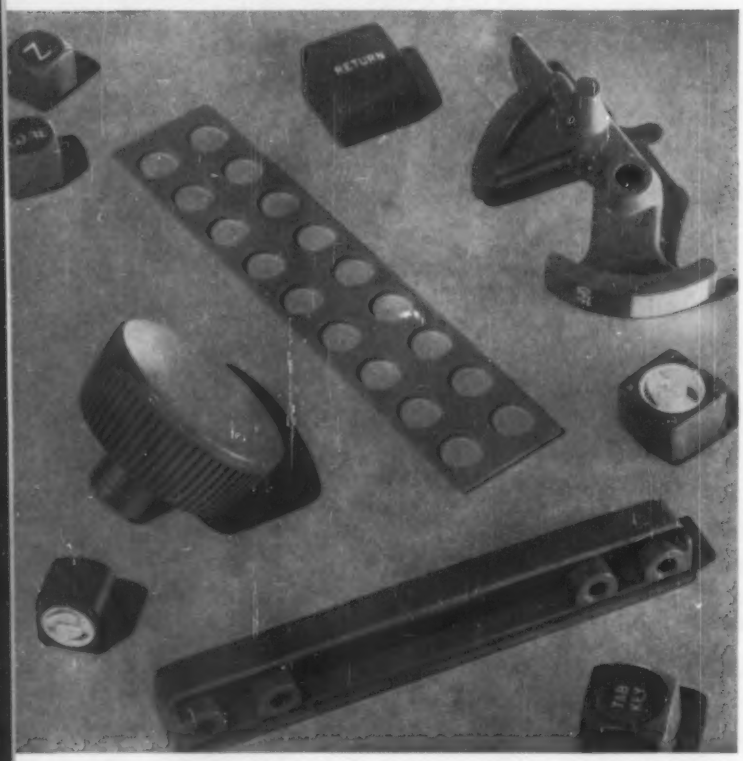
PHENOLICS
STYRENES
IMPACT STYRENES
POLYETHYLENES
VINYLS
POLYESTERS
EPOXIES

Finding the right plastic for your product need not take a great deal of time. Here's a suggested short-cut: work through a single supplier—the one with the greatest variety of materials to choose from.

Bakelite Company not only offers the broadest selection of materials, but also provides the guidance of qualified technical representatives backed by extensive research and development facilities—with plants and warehouses located for prompt delivery and service. All these advantages are the result of 46 years' experience in the plastics field.

(continued on next page)

(continued from previous page)



Parts molded of C-11 Plastics for **International Business Machines Corporation,** New York 22, N. Y., include:
Key plate and buttons—**American Plastics Corp.,** Bainbridge, N. Y.
Space bar and knobs—**Auburn Button Works,** Auburn, N. Y.
Switch—**Consolidated Molded Products Corp.,** Scranton, Pa.

"C-11" Plastic for electric typewriter keys, buttons, bars

BAKELITE Brand C-11 Plastic is shown here molded into keys, knobs and bars for electric typewriters and accounting machines. The subdued surface finish and gray color of these pieces make them easy on the eyes. Flawless details testify to the moldability of C-11 Plastics; the buttons are two-shot molded—their white letters are part of a white C-11 insert that's intricately formed on the underside to clip onto the key arm.

This styrene-acrylonitrile copolymer was chosen for its unusual resistance to chemicals. As a result, it's used here to prevent staining by oils, inks, carbon paper, and cleaning fluids. The chemical resistance of C-11, in combination with toughness and good finish, has led to wide use in many fields, including housewares, packaging, and mechanical devices.

Polyethylene insecticide tank is extra-light, extra-durable

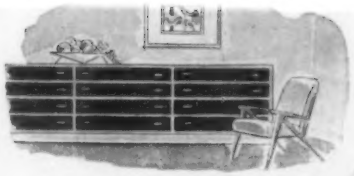
BAKELITE Brand Polyethylene is an outstanding material for this garden sprayer gallon tank. The extremely light weight of polyethylene is a distinct advantage since the insecticide contents alone could weigh up to eight pounds. Chemical resistance, another feature of polyethylene, provides freedom from corrosion and rust problems. In addition, the toughness of this material makes the tank resistant to denting and breakage.

Light weight, chemical resistance, and resilience are just part of the polyethylene story. A variety of molded products also make use of its outstanding dielectric properties, extremely low moisture absorption, and range of color possibilities.

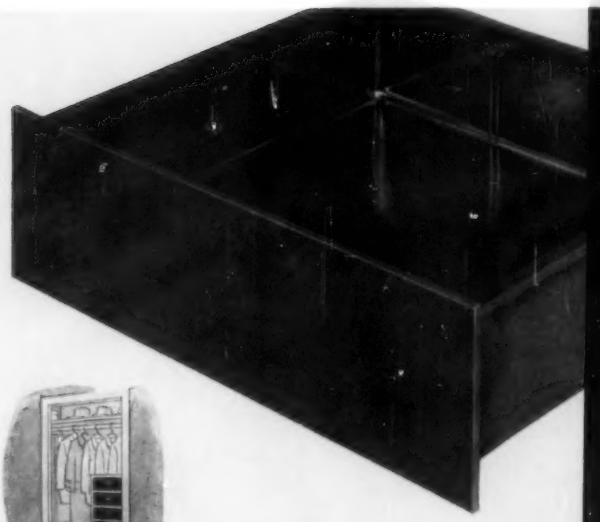


"My-ti-lite" garden sprayer made by **B&G Company,** Plumsteadville, Pa., with tank molded by **Plax Corp.,** Hartford, Conn.

(continued on next page)







Plastic drawers build plastics molding business

Molded plastic drawers are an example of what molders can do with the right idea and the materials to carry it out. These drawers have an eager market among builders, furniture manufacturers, and do-it-yourself craftsmen. They're useful for room dividers, furniture, built-in cabinets. Some reasons for their popularity; no warping . . . no joints, seams, or glue . . . smooth operation . . . rounded corners that simplify cleaning.

BAKELITE Brand Phenolic Plastic is used for rich, glossy-black drawers that contrast beautifully with light-grained cabinet woods. They can be drilled for metal pulls that lend a striking accent. Various sizes are now in production.

BAKELITE Brand Impact Styrene Plastics provide toughness, light weight and wide color range for drawers that meet the need for bright modern furniture styling.

"C-11" monofilament bristles improve on nature

BAKELITE Brand C-11 extr ies into an excellent monofilament for brush bristles. Here is a further step; the tips of these modified styrene monofilament bristles are "flagged"—burst to form a frayed, shredded end.

This makes the monofilament bristles softer . . . easier on delicate surfaces. They soak up more water and distribute it evenly. Used dry, they pick up more dust particles because their characteristically electrostatic surface has been increased.

With these advantages, plus the other outstanding properties of BAKELITE C-11, the monofilaments surpass natural bristles. These materials are resistant to chemicals, staining, and temperature change . . . offer a range of colors . . . stay tough and resilient.



Brushes made by **Laitner Brush Co.**, Detroit 26, Mich., with monofilament bristles manufactured by **Mack Molding Co.**, Arlington, Vt.

One plastics source . . .

PHENOLICS
STYRENES
IMPACT STYRENES
POLYETHYLENES
VINYLS
POLYESTERS
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BAKELITE BRAND **PLASTICS**

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Trade-Mark

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FLEXOL Plasticizer DOP (di(2-ethylhexyl) phthalate)—the "standard" plasticizer for vinyls for more than ten years.

FLEXOL Plasticizer 426 (a mixed alcohol phthalate) saves you money and offers quality, too.

FLEXOL Plasticizer 810 (a higher alcohol phthalate) is outstanding for its low volatility and the improved low-temperature properties it imparts to vinyls. Plastisols made with 810 have excellent viscosity stability.

FLEXOL Plasticizer 10-10 (didecyl phthalate) is the least volatile of phthalate plasticizers—it has good electrical properties and is a good dispersant, too.

FLEXOL Plasticizer CC-55 (di(2-ethylhexyl) hexahydrophthalate) is an excellent dispersant for vinyl plastisols with stable, low viscosities.

To be sure you have the right phthalate every time, call or write the nearest CARBIDE office. In Canada: Carbide Chemicals Company, Division of Union Carbide Canada Limited, Toronto.

The term "Flexol" is a registered trade-mark of Union Carbide and Carbon Corporation

stabilizers suitable for use in making vinyl film for packaging foods were listed (400).

Experimental evidence was presented that the electrical charge imparted to a plastic during molding is a volume rather than a surface charge; its timewise behavior as it drains out of the plastic was demonstrated (401). These and other observations (402, 403) have important practical applications in the control of static charges on plastics and bonded structures.

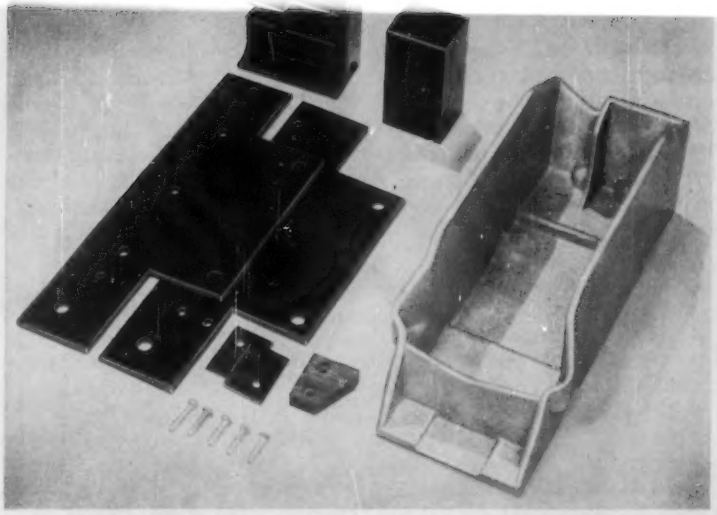
Processing

Modern methods (404-406) and materials (407-409) for the production of molds were discussed by various authors. Problems of mold design (410, 411) and estimating costs of molds (412) and molded parts (413) were reviewed. Developments in the technology of injection molding (414-425), compression molding (426-429), extrusion (430-442), vacuum-forming (443-450), calendering (451, 452), and casting (453) and polishing (454) of plastics sheets were described.

Automation continued to make important gains in the processing of plastic materials and products (455-458). Various types of heating methods and equipment were proposed (459-463). Fabricating and finishing techniques dealt with included barrel tumbling (464, 465), decoration of molded parts (466-468), metallizing parts and films (469-471), and welding and powder spraying of plastic materials (472). A symposium on engineering aspects of production of high polymers reviewed methods of synthesizing resins and control of processing variables (473). An ultrasonic method for the inspection of fabricated parts was described (474).

Applications

Electrical: The 1956 Conference on Electrical Insulation explored developments in very high temperature insulation and nuclear-radiation-resistant materials. Two papers dealt with new materials. One described vinyl-substituted "solventless" silicones for producing void-free parts in impregnation, encapsulation, and potting operations. The vinyl-containing silicones are dissolved in fully reactive silicones of low viscosity (10 to 20 cp.) and are cured at 120° to 200° C. The other material development concerned glass-flake reinforcement for laminates, molding compounds, and flexible insulation. A 100% glass-flake paper has been prepared. The glass flakes have been evaluated as a reinforcing agent in polyethylene molding compound (475, 476).



One-piece circuit-breaker support (right), molded of polyester-glass premix, replaces seven-part unit (left). (Photo, Glastic)

Cellulose acetate and polyester film are finding a rapidly growing market in magnetic recording tapes; a microscopically thin layer of iron oxide and vinyl resin binder is applied to the plastic. Production of magnetic tape has doubled since 1953 and reached about 6 billion ft. in 1955 (477).

Potting and encapsulation of electrical assemblies to protect them against oxidation, moisture, fungi, and mechanical shock have become important factors in improvement of performance of military and industrial electrical equipment. The characteristics of various potting resins, including phenolic, allyl, polyester, styrene, acrylic, isocyanate, and epoxy types, and the practical details of potting by the vacuum method and by centrifugation were reviewed (478-481). Plastic-bonded magnets and flexible ferro-magnetic materials are making possible the design of smaller, more efficient electronic components (482, 483).

Transportation: It is estimated that the motor car industry in 1955 used approximately 10 lb. of plastics per car or about double the 1950 use. The car now requires 15 sq. yd. of vinyl sheeting and coated fabrics for upholstery and interior decoration; further, about nine-tenths of all automotive wiring is vinyl insulated. Reinforced plastics are going into heater and air-conditioner parts, body panels, fenders, and dashboard assemblies, as well as complete sports car bodies pioneered by the Chevrolet Corvette. Other plastics contributing to the modern automobile are nylon, acrylic, butyrate, styrene alloys, and foamed plastisols and isocyanates (484, 485). Glass-fiber-reinforced polyester laminates are making in-roads in the construction of truck and trailer bodies, both in the small, lightweight delivery vehicles and in massive over-the-road trailers and tanks (326).

Raw materials specifications, accurate process control methods, and parts inspection techniques are seen as needed to expand uses of reinforced plastics in aircraft and missile structures (328, 486-490). Some of the major problem areas include rain erosion, aerodynamic heating, transparent enclosures, radomes, and sandwich structures (491). Plastics are presently being used in missiles to the extent of about 1,000,000 lb. per year as solid fuel binders, in structural components and elec-

tronic parts, and for bonding, coating, and sealing (492). An auxiliary but growing use of plastics in aircraft and missile construction is in tooling which permits design changes to be made readily during the development and testing stages (493-496).

Intensified demand for low operating and maintenance costs in public transportation has accented the use of plastics in a new railway passenger car built by the Budd Company. Seating, flooring, wall panels, lighting, stairwell, and one-piece lavatory unit (including wall, sink, and toilet) comprise an all-plastics interior scheme. The weight of the car represents 595 lb. for each of the 88 passengers compared to 1678 lb. for each of 74 passengers for the conventional coach (497). The marine industry continues to bring out new models of reinforced plastics boats (333, 498).

Packaging: Self-service in retail outlets and visibility packages have combined to make plastics a dominant force in the packaging industry. Low-cost styrene plastics geared to high-speed mass production of thin-walled throwaway containers were much in evidence at the 1956 Packaging Exposition. A novel item was a Mylar bag for precooked foods that could be heated as a unit; the polyester film was also emphasized for use as a thin film for heavy packages or extra strong windows. Other films and sheeting that are benefiting by the trend to transparent packaging include cellulose acetate, polyethylene, saran, and vinyls (499). Polychlorotrifluoroethylene and polyester films were found to be most suitable for packaging heat-processed foods that require exposure to 250° F. for 30 min. (500). Many other developments in the use of plastics for packaging were reported (132-134, 193, 224, 501-508). A comprehensive survey provided detailed advice on proper packaging of plastic products to reduce damage losses and to cut costs by making full use of every cubic foot of storage and shipping space (509).

Medical: One of the more unusual applications of plastics is that of tubes of polyvinyl alcohol foam to replace sections of arteries in the human body (510). Other medical items developed include catheters (511), disposable specula (512), medicine droppers (513), optical lenses (514), and eyeglass frames with built-in miniaturized hearing aids (515). Information available on industrial hygiene problems in the manufacture and fabrication of plastic materials was surveyed (516, 517).

An especially noteworthy report presented the results of a 4-year extensive study by the National Sanitation Foundation to determine the suitability of plastic pipe for the transmission of cold water for drinking purposes. The pipes tested were made of polyethylene, rubber-modified styrene, polyvinyl chloride, polyvinylidene chloride, and cellulose acetate butyrate. The study showed that such pipes specifically recommended for use with potable water supplies do not make the water toxic, unsightly, or unpalatable, and do not interfere in any way with maintenance (518).



Acrylic sheets extruded with "tongue - in - groove" edges serve as walls of microwave relay station. (Photo, Sheffield)

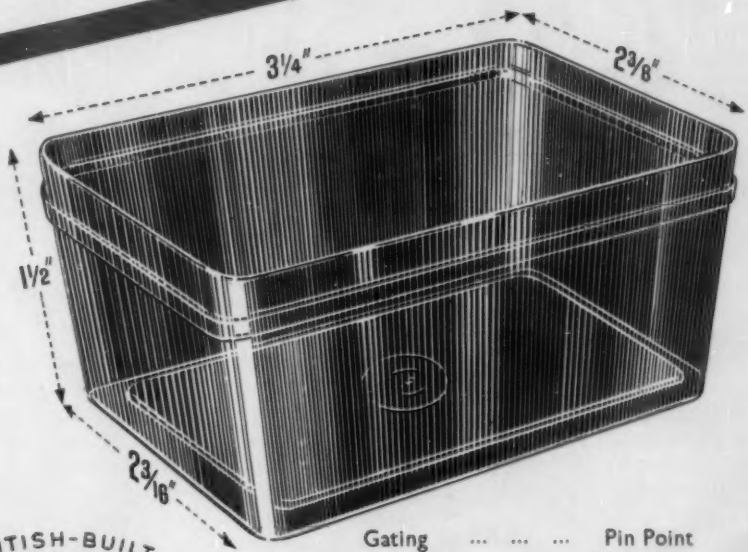
Other applications: The potential market for plastics in the building industry is receiving the attention of both architects and plastics engineers. An entirely new sphere of application in structural and semi-structural units is visualized in addition to the traditional uses in wall covering, flooring, glazing, panelling, and ducts (6, 519-523). A new simple method of welding thermoplastic pipe joints by resistance heating is expected to promote further development of this market (524-527). Corrosion-resistant pumps (528) were among the many items of chemical engineering equipment in which plastics are providing longer and more economical service (66, 336, 337, 529-531). Table tops that won't stain, drawers that won't stick, lifetime upholstery, sagless padding, and an endless variety of decorative effects, combined with significant production economies, are important factors in extending the use of plastics in the furniture industry (532). Other application reports pertain to bearings (533), abrasive products (534), lighting (535), a solar battery for telephone lines (536), a sun-powered radio (537), calculator devices (538), and textile products (539-543).

Adhesives: The increasing use of resin bonding in rapid assembly and efficient structural use of materials for engineering purposes was evident in the large number of reports presenting new data and reviewing developments in adhesives (544, 545), including epoxies (54, 546-549), polyvinyl acetate (550, 551), urea formaldehyde (552), and pressure-sensitive tapes (553, 554). An investigation of metal-bonding adhesives for high-temperature service showed that a phenolic-epoxy formulation was resistant to 200 hr. aging at 550° F. and is particularly promising in tape form for bonding sandwich constructions (555). Guide lines for the choice of adhesives and bonding methods for cementing plastics to plastics and to nonplastics were given in an outline (556).

The adhesive properties of epoxy resins on a polar surface (aluminum) were found to correlate well with their hydroxyl content; the shrinkage of the epoxy resin mixtures on cooling decreased with hydroxyl content (557). Other investigators studied the relation between electrostatic charges at break and bond strengths (558), shear strength of metal-bonding adhesives (559),

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climbing peel strength (560), and pot life (561).

Coatings: A comprehensive report on coatings for plastics covered paint, ink, metallic, flock, and other finishes; special problems peculiar to the painting of plastics include etching, crazing, plasticizer migration, and solvent absorption (562). The economics of the $700-million coatings market (563) and developments in cellulosic (111, 564, 565), epoxy (53, 58), ethylene (135), fluorocarbon (161, 162), styrene (566) and isocyanate (38, 39, 567) finishes were reviewed (568-570). The mechanism of wash primer action in retarding corrosion and enhancing film adhesion to iron was established by the use of X-ray and electron diffraction, electron and optical microscopy, infra-red spectroscopy, and paramagnetic resonance techniques (571). Accelerated mildew-resistance test (572) and methods for evaluating permeability, thickness, adhesion, flexibility, and abrasion resistance of coating films (573) were described.

Properties

Three noteworthy reports presented data that are important in the use of plastics as engineering materials; among the significant characteristics cited in these surveys are ease of fabrication, light weight, adaptability to combinations with other materials to achieve new structural effects, and the ability to vary many of their properties over a wide range to suit the needs of a specific application (574-576). An outstanding report presented ultraviolet, luminous, and infra-red spectral-transmissive and other pertinent data on commercially available plastics suitable for use in eye-protective devices in industrial and other operations (577). The behavior of plastics under concentrated shock compressive loads resulting from explosions was observed in an unusual investigation (578).

A low-amplitude vibrational test proved to be eminently satisfactory as a non-destructive method for measuring the degradation of mechanical properties during heat-aging of a glass cloth laminate; 1/40 as many specimens were required as would be needed for the conventional type of program; the 20-yr. life, continuous operating temperature limit for the laminate was estimated to be 120 to 130° C. (579). Many significant contributions were made to our knowledge of the dynamic (580-587) and viscoelastic (588-590) properties of plastics. Other reports on mechanical properties of plastics related to tensile behavior (591-595), flexural properties (596), impact strength (597, 598), creep (599-602), friction (603), and snag resistance of plastic coated fabrics and films (604).

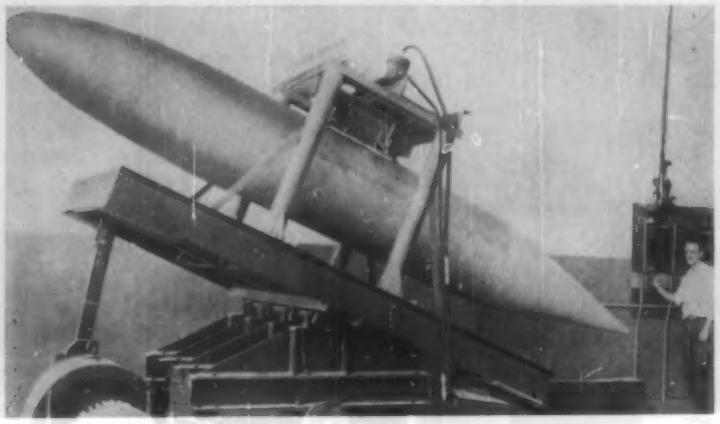
The significant effect of stress during outdoor exposure was emphasized in a study of the surface deterioration, crazing, and creep deformation of transparent plastics in weathering tests (605). Aging effects observed under fluorescent sunlamps (606) and in the tropics (607) were reported. Other property studies dealt with corona (608-610) and humidity (611) effects on electrical properties, heat distortion temperature measurements (612, 613), heat capacity (614, 615), photoelastic behavior (616), birefringence (617), infra-red spectrophotometry (618), water sorption (619, 620), water vapor (621, 622) and gas (623-625) permeability, osmometry (626, 627), viscosity (628), crystallinity (629, 630), and an ultrasonic method for measuring degree of cure of plastics (631).

Methods were reported for analysis of alkyd (632, 633), epoxy (634), acrylic (635), and polyoxyethylene phenyl ether (636) resins and identification of plastics (637).

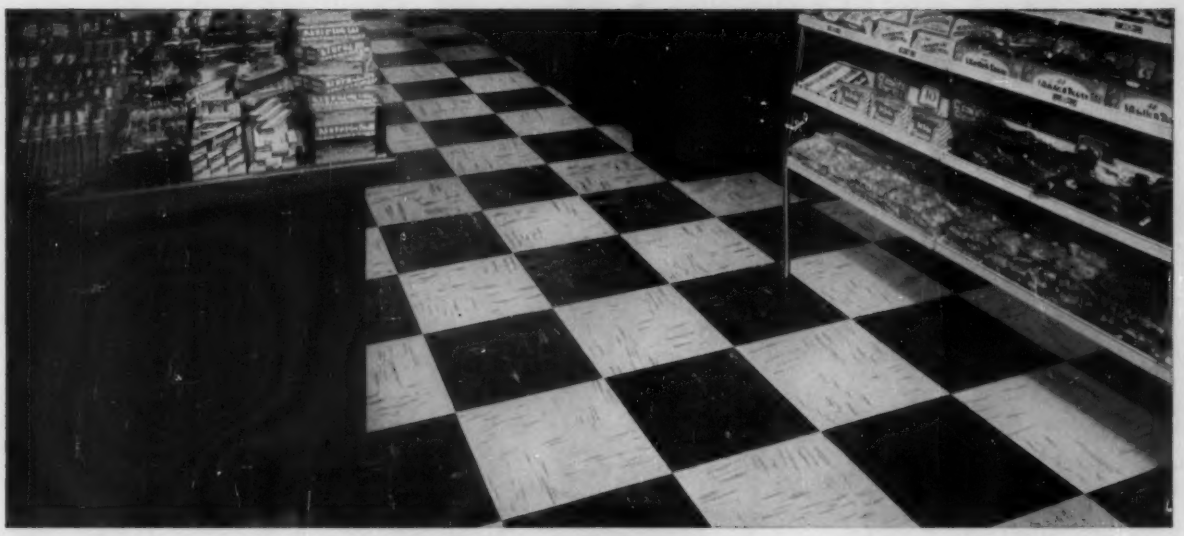
Standards

Notable progress was made by Technical Committee 61 on Plastics of the International Standardization Organization (ISO/TC 61) at a meeting in The Hague in September in drafting international standard procedures for testing plastics. The eight Working Groups prepared 9 new or revised draft ISO proposals relating to Charpy and Izod impact strength, standard laboratory atmospheres for conditioning and testing plastics, melt flow index of polyethylene, incandescence resistance, thermal stability of polyvinyl chloride by Congo red and discoloration methods, and bleeding of colorants from plastics. Nine draft ISO recommendations were approved for submission to the ISO member countries for ballot; these dealt with equivalent terms and test methods for flexural properties, bulk factor of molding compounds, free ammonia in phenolic moldings, styrene in polystyrene, viscosity of polyvinyl chloride solutions, resistance of plastics to chemicals, and loss and migration of plasticizers from plastics. In addition, 5 methods were approved for submission to the ISO Council for adoption as ISO recommendations and 4 draft ISO recommended methods approved at the 1955 meeting are in the process of review by ISO member countries. The 1957 meeting will be held in Switzerland; the American Stand-

Droppable jet-plane fuel tank, here being tested for resistance to vibration, is molded of reinforced plastics. (Photo, Admiral Corp.)



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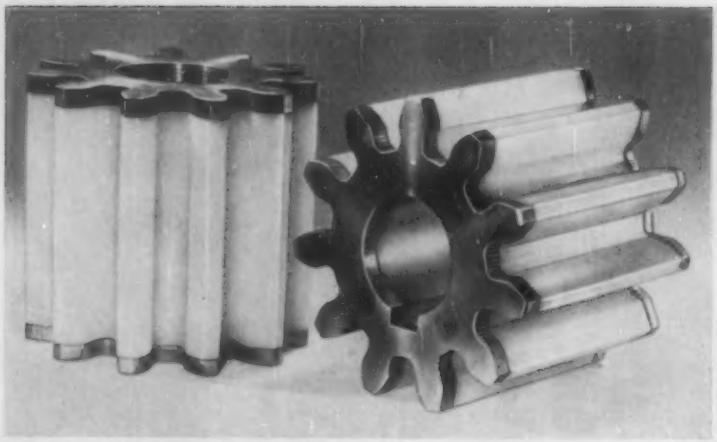
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Gears for use in anchor winch are machined from centrifugally cast nylon-6 pipe. Gear weighs about 7 pounds. (Photo, Spencer Chemical)

ards Association has invited the committee to meet in the United States in 1958 (638).

Another ISO group, ISO/TC 5/SC 6 on Plastics Pipes and Fittings, is working on test methods for dimensions, working pressures, brittleness, and effect of the plastic on water, and specifications for dimensions, tolerances, pressures, and other technical and acceptance requirements. This group held its second meeting in Switzerland in March 1956 (639).

A.S.T.M. Committee D-20 on Plastics adopted 6 new tentative standards. These included specifications for 1) nonrigid polyvinyl chloride and copolymer molding and extrusion compounds (D 1432-56T), 2) polychlorotrifluoroethylene molding and extrusion materials (D 1430-56T), and 3) styrene acrylonitrile copolymer molding and extrusion materials (D 1431-56T); test methods for 1) flammability of flexible thin plastic sheeting (D 1433-56T) and 2) gas transmission rate of plastic sheeting (D 1434-56T); and a recommended practice for outdoor weathering of plastics (D 1435-56T). Important revisions were made in the specifications for polystyrene molding compounds, melamine-formaldehyde molding compounds, methacrylate molding and extrusion compounds, and cast methacrylate plastic sheets, rods, tubes, and shapes. Test methods for chemical resistance and flammability of plastics were revised. New definitions were added to the list of terms relating to plastics (640, 641).

Drafts of three recommended Commercial Standards have been circulated to the industry for acceptance; these cover melamine dinnerware (alpha-cellulose filled) for household use, and dimensions and tolerances for 1) rigid polyvinyl chloride pipe and 2) solvent-welded cellulose acetate butyrate pipe. The Society of the Plastics Industry has committees working on the preparation of other commercial standards, including standards on garden hose, polyethylene film, reinforced plastics products, and plastics foams.

References

1. "Resin production during 1955," Modern Plastics *34*, 206-207 (Oct. 1956).
2. "Analysis of plasticizer production in 1955," by H. I. Armstrong, P .W. Spink, and W. F. Waychoff, Modern Plastics *34*, 144-146, 286, 288, 291 (Oct. 1956).
3. "Market factors affecting plastics in the years ahead," Modern Plastics *33*, 150-154 (June 1956).
4. "Plastics materials in the years ahead," Modern Plastics *33*, 155-163, 356-357, 359, 361-362, 364, 366, 368, 370 (June 1956).
5. "Plastics engineering in the years ahead," Modern Plastics *33*, 179-182, 403, 407-408 (June 1956).
6. "Plastics applications in the years ahead," Modern Plastics *33*, 164-178, 374, 376, 381-382, 385, 387-388, 391, 393-394, 397-398, 400 (June 1956).
7. "Japan: petrochemical future," by E. S. Miyamoto, Modern Plastics *33*, 90-95 (May 1956).
8. "France: advanced techniques," by J. Combette, Modern Plastics *33*, 96-100 (May 1956).
9. "Israel: study in versatility," by T. Bar-Ilan, Modern Plastics *33*, 101-104 (May 1956).
10. "Great Britain: new power plus new materials," by V. E. Yarsley, Modern Plastics *33*, 188-191, 418-419 (June 1956).
11. "Argentina: restrictions lifted," by F. Masjuan, Modern Plastics *33*, 192-194 (June 1956).
12. "Italy: engineering advance," by G. Moretti, Modern Plastics *33*, 90-94, 198-199 (July 1956).
13. "Benelux: Expansion based on research," by P. Schwencke, Modern Plastics *33*, 110-114, 222 (Aug. 1956).
14. "Australia: great growth in past decade," by K. E. Von Wolff, Modern Plastics *34*, 117-121 (Sept. 1956).
15. "Germany: phenomenal resurgence," by B. Rau, Modern Plastics *34*, 138-143, 278, 280, 282 (Oct. 1956).
16. "Sweden: fast increase in consumption," by J. E. Janson, Modern Plastics *34*, 120-123, 232, 234-236, 239, 242 (Nov. 1956).
17. "Norway: obstacles being overcome," by H. J. Knap, Modern Plastics *34*, 123 (Nov. 1956).
18. "Spain: Growth under difficulties," by J. Fontan-Yanes, Modern Plastics *34*, 143-145 (Dec. 1956).
19. "Puerto Rico unique tax status brings results," by E. T. Ellenis, Modern Plastics *34*, 139-142 (Dec. 1956).
20. "Around the world in plastics," by R. Ernst, Modern Plastics *33*, 105, 224, 226 (May 1956).
21. "At the 7th N.P.E. and the 1956 National S.P.I. conference," Modern Plastics *33*, 97-104 (July 1956).
22. "Heat-resistant methylstyrene polymers," by J. A. Melchore, Modern Plastics *33*, 163-164, 166, 250, 252 (Mar. 1956).
23. "Hercules introduces new plastic from pentaerythritol," Modern Plastics *33*, 238 (Jan. 1956).
24. "New plateau for plastics," Modern Plastics *34*, 300, 302 (Oct. 1956).
25. "High-density polyethylenes," Modern Plastics *33*, 234, 236 (Aug. 1956).
26. "Stereospecific catalysis and isotactic polymers," by G. Natta, Angewandte Chemie *68*, 393-403 (June 21. 1956); Modern Plastics *34*, 169 (Dec. 1956).
27. "New look at polypropylene," Chem. Week *78*, 69-70 (Feb. 4, 1956).
28. "Orientation upgrades polypropylene fiber," Chem. Week *78*, 64-66 (June 16, 1956).
29. "Polyolefins: will three be a crowd?" Chem. Week *78*, 79-80 (June 16, 1956).
30. "Wraps off polypropylene," Chemical and Engineering News *34*, 2980 (June 18, 1956).
31. "Structure of crystalline 1,2-polybutadiene and other 'syndyotactic' polymers," by G. Natta and P. Corradini, Journal of Polymer Science *20*, 251-266 (May 1956).
32. "Acidity and polymerization of solid acid catalysts," by O. Johnson, J. Phys. Chem. *59*, 827-831 (Sept. 1955).
33. "Stereospecific plastics," Modern Plastics *33*, 45-48 (Sept. 1956).
34. "Coral rubber—a cis-1,4-polyisoprene," by F. W. Stavely and coworkers, Ind. Eng. Chem. *48*, 778-783 (Apr. 1956).
35. "Ameripol SN—A cis-1,4-polyisoprene," by S. E. Horne, Jr., J. P. Kiehl, J. J. Shipman, V. L. Folt, C. F. Gibbs, E. B. Newton M. S. Reinhart, and E. A. Willson. Ind. Eng. Chem. *48*, 784-791 (Apr. 1956).
36. "Symposium on isocyanate polymers." Preprint booklet of the Division of Paint, Plastics, and Printing Ink Chemistry, American Chemical Society, Atlantic City meeting, Sept. 1956.
37. "Isocyanate symposium." Preprint booklet of the Upper Midwest Section, Society of Plastics Engineers, Minneapolis meeting, Oct. 23, 1956
38. "Some uses of polyurethanes in electronics and surface coatings," by J. Brennan, Brit. Plastics *28*, 417-420 (Oct. 1955).
39. "Urethane coatings go down to the wire," Chem Week *78*, 60, 62, (May 5, 1956).
40. "Preparation, properties, and applications of isocyanate products," by W. E. Kenline and R. D. Hirschbeck, Plastics Tech. *2*, 168-174, 178-179 (Mar. 1956).
41. "Isocyanate-resin-coated glass cloth insulation," by H. G. Steffens, Electrical Mfg. *57*, 114-115 (Jan. 1956).
42. "Isocyanate-base polymers," by I. Katz, Materials and Methods *42*, 84-88 (Aug. 1955).
43. "Current developments in foamed polyurethanes," Brit. Plastics *29*, 5-9, 39 (Jan. 1956).
44. "Polyrubber: your pick of properties," by D. R. Cannon, Chem. Eng. *62*, 142, 144, 146 (Nov. 1955).
45. "Urethane rubber from a polyether glycol; properties of raw polymer and vulcanizates," by F. B. Hill, C. A. Young, J. A. Nelson, and R. G. Arnold, Ind. Eng. Chem. *48*, 927-929 (May 1956).
46. "Urethane rubber from a polyether glycol. Factors influencing processability," by J. S. Rugg and G. W. Scott, Ind. Eng. Chem. *48*, 930-933 (May 1956).
47. "Chemical relaxation of stress in polyurethane elastomers," by J. A. Offenbach and A. V. Tobolsky, J. Colloid Sci. *11*, 39-47 (Feb. 1956).
49. "A potting compound and mold for precision pottings," by W. H. Crandall, SPE J. *12*, 20-23 (July 1956).
50. "How to make and repair epoxy

dies," by N. E. Talbert, Modern Machine

energy," by R. H. Burns and H. Wells,

115. "Thermal degradation of wood and

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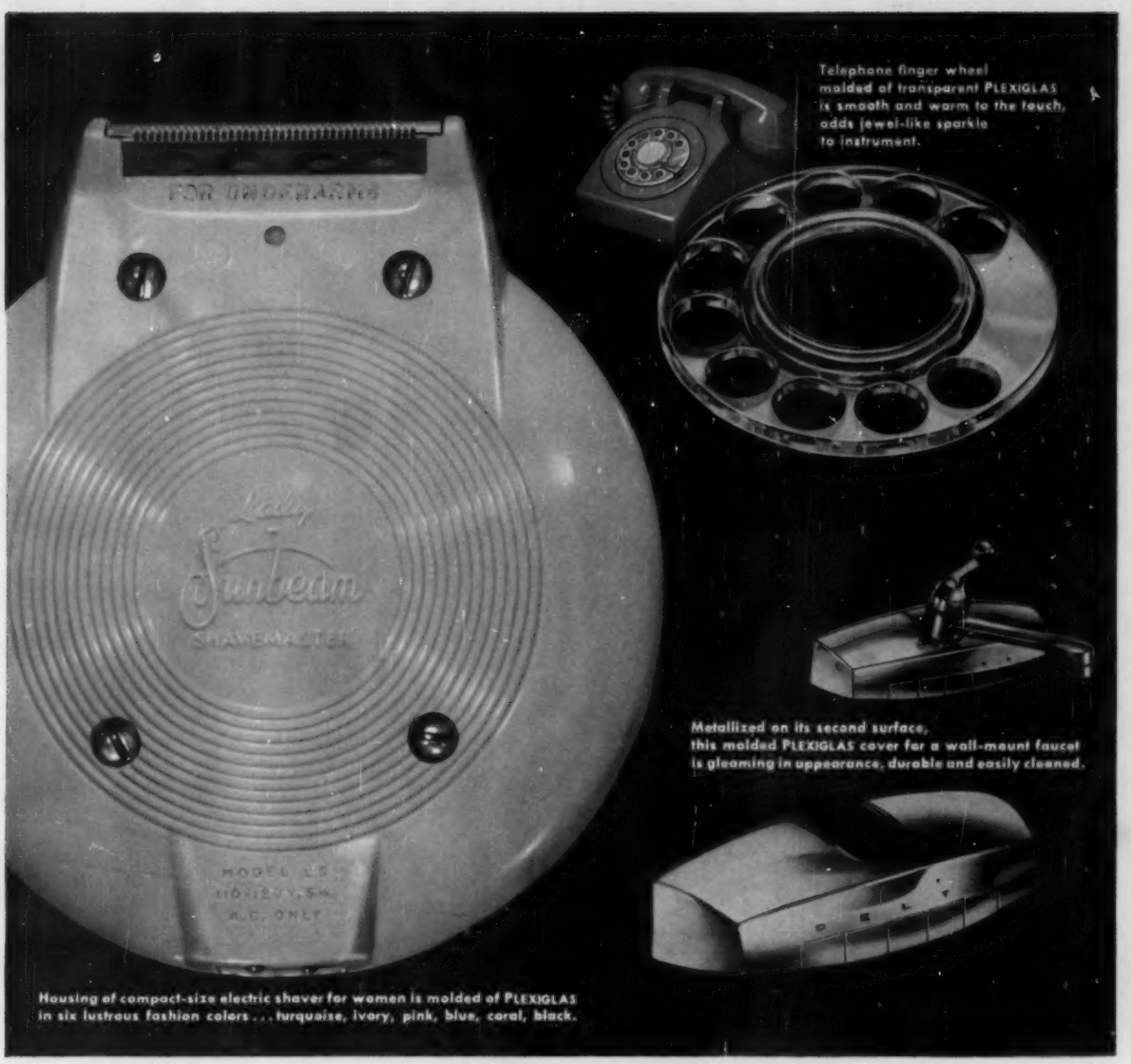
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dies," by N. E. Talbert, Modern Machine Shop *28*, 128-132 (Jan. 1956).
51. "Long term strengths of reinforced epoxy pipe," by H. D. Boggs, Plastics Tech. *2*, 459-462 (July 1956).
52. "Thin-wall epoxy-glass tubing," by W. E. Ponemon, Modern Plastics *34*, 139-142 (Nov. 1956).
53. "How new internal coatings are proving their worth," by W .T. Theis, Oil and Gas Journal *54*, 151-153 (Feb. 13, 1956).
54. "Room-temperature bonding," by J. L. Been, Modern Plastics *33*, 126, 128, 133-134, 136-137, 244 (Mar. 1956).
55. "Epoxy resins as plasticizers and stabilizers for vinyl chloride polymers," by L. P. Witnauer, H. B. Knight, W. E. Palm, R. E. Koos, W. C. Ault, and D. Swern, Inc. Eng. Chem. *47*, 2304-2311 (Nov. 1955).
56. "Epoxy resins for Electrical applications," by H. Rudoff and A. J. Rzeszotarski, SPE J. *12*, 31-35 (Feb. 1956).
57. "Reinforced epoxy in airline tray carriers," by N. E. Talbert, Plastics Tech. *2*, 101-104 (Feb. 1956).
58. "Polyamide-epoxy resins," by D. E. Floyd, W. J. Ward, and W. L. Minarik, Modern Plastics *33*, 238, 240, 242, 247-248, 250 (June 1956).
59. "Epoxy-ether resins: a new technology," by E. G. Shur, Modern Plastics *33*, 174, 176, 274, 276 (Apr. 1956).
60. "New epoxide resins by reaction of epichlorohydrin with sulfonamides," by M. Cohen, Ind. Eng. Chem. *47*, 2095-2101 (Oct. 1955).
61. "Polysulfide-epoxy compositions," by E. H. Sorg, and C. A. McBurney, Modern Plastics *34*, 187-190, 192, 194, 196, 198, 203-204, 294 (Oct. 1956).
62. "Epoxy casting resins modified with polysulfide liquid polymer," by K. R. Cranker and A. J. Breslau, Industrial and Engineering Chemistry *48*, 98-103 (Jan. 1956).
63. "Epoxy resins," by J. R. Charlton, Can. Plastics *1955*, 31-36, 41 (Dec.).
64. "Determination of cure and analysis of cured epoxy resins," by H. Dannenberg and W. R. Harp, Jr., Analytical Chem. *28*, 86-90 (Jan. 1956).
65. "Symposium on epoxy resins." Preprint booklet of the Division of Paint, Plastics, and Printing Ink Chemistry, American Chemical Society, Atlantic City meeting, Sept. 1956.
66. "Epoxy resins—An engineering material for the chemical industry," by B. I. Zolin and J. G. Green, E. I. du Pont de Nemours and Co., Inc.
67. "Radiation stability of plastics and elastomers," by C. D. Bopp and C. Sisman, Nucleonics *13*, 28-33 (July 1955).
68. "How radiation changes polymer mechanical properties," by C. D. Bopp and O. Sisman, Nucleonics *13*, 51-55 (Oct. 1955).
69. "Irradiation of plastics," by D. S. Ballantine, SPE J. *12*, 27-31, 49 (July 1956).
70. "Irradiation of long-chain polymers," by A. Charlesby, Chem. Eng. Prog. *51*, 476-478 (Oct. 1955).
71. "Cross-linking of polymers by γ-rays in dilute aqueous solution," by P. Alexander and A. Charlesby, Gt. Brit. Atomic Energy Research Establishment Report M/R 1664 (May 9, 1955).
72. "Radiation in the plastics industry," by R. Rooerts, Plastics (London) *21*, 116-117 (June 1956).
73. "Radiation damage to elastomers, plastics, and organic liquids," by C. G. Collins and V. P. Calkins, General Electric Co., Atomic Products Div. (Sept. 1955).
74. "A new material: irradiated polyethylene," by F. J. Brockhoff and J. A. Neumann, Chem. Eng. *62*, 228, 230, 232, 234 (Sept. 1955.)
75. "Irradiated, filled polyethylene," Chem. Eng. News *33*, 5091-5092 (Nov. 21, 1955).
76. "Effects of radiation on organopolysiloxanes," by E. L. Warrick, Industrial and Engineering Chemistry *47*, 2388-2393 (Nov. 1955).
77. "Changes in silicone polymeric fluids due to high-energy radiation," by A. Charlesby, Proc. Royal Soc. London *230A*, 120-135 (June 7, 1955).
78. "Radiation induced changes in the structure of polyisobutylene," by P. Alexander, R. M. Black, and A. Charlesby, Proc. Royal Soc. London *232A*, 31-48 (Oct. 11, 1955).
79. "Radiation protection in copolymers of isobutylene and styrene," by P. Alexander and A. Charlesby, Proc. Royal Soc. London *230A*, 136-145 (June 7, 1955).
80. "Chemical activity of gamma-irradiated polymethyl methacrylate," by L. A. Wall and D. W. Brown, Journal of Research National Bureau, of Standards *57*, 131-136 (Sept. 1956).
81. "Rubber and plastics as materials of construction in the field of atomic energy," by R. H. Burns and H. Wells, Rubber and Plastics Age *37*, 33-34 (Jan. 1956).

Materials

82. "Why there will be more acrylic makers," Chem. Week *78*, 17-19 (June 2, 1956).
83. "Stretched acrylic sheet—a new engineering material," Modern Plastics *34*, 102-104 (Sept. 1956).
84. "Effects of multiaxial stretching on crazing and other properties of transparent plastics," by I. Wolock and D. A. George, SPE J. *12*, 20-27 (Feb. 1956).
85. "Acrylic stretch," Chem. Week *77*, 42 (Nov. 5, 1955).
86. "Stretching large-area acrylic sheet," by A. Batzdorff, Plastics Tech. *2*, 463-465 (July 1956).
87. "Characteristics of biaxially stretch-oriented acrylics," by D. A. Hurst, SPE J. *12*, 18-27, 53 (May 1956).
88. "Forming acrylic sheet by infrared heating," Brit. Plastics *29*, 297 (Aug. 1956).
89. "Extruded panels," Modern Plastics *33*, 210 (May 1956).
90. "Reinforced acrylic," Modern Plastics *33*, 337 (June 1956).
91. "Plastic penthouse," Modern Plastics *33*, 92-94, 229 (Feb. 1956).
92. "Acrylics for street lighting," by P. H. Collins, Plastics (London) *21*, 149-152 (July 1956).
93. "Acrylic tanks," Modern Plastics *33*, 196 (Feb. 1956).
94. "Investigation of the dynamic mechanical properties of polymethyl methacrylate," by B. Maxwell, J. Polymer Sci. *20*, 551-556 (June 1956).
95. "Dynamic mechanical properties of polymethyl acrylate," by M. L. Williams and J. D. Ferry, J. Colloid Sci. *10*, 474-481 (Oct. 1955).
96. "Surface degradation of Perspex by ultrasonic radiation," by N. H. Langton, Plastics (London) *21*, 118-120 (June 1956).
97. "Designing with transparent plastics," by A. M. Blumenfeld, SPE J. *12*, 28-30, 54 (Feb. 1956).
98. "Accelerating effect of amines on polymerization of methyl methacylate," by G. M. Brauer, R. M. Davenport, and W. C. Hansen, Modern Plastics *34*, 153 (Nov. 1956).
99. "Sulfinic acid derivatives as accelerators in the polymerization of methyl methacrylate," by G. M. Brauer and F. R. Burns, J. Polymer Sci. *19*, 311-321 (Feb. 1956).
100. Vinyl cyanide. VII. Copolymerization.," by H. Gilbert, S. J. Averill, E. J. Carlson, V. L. Folt, H. J. Heller, F. D. Stewart, R. F. Schmidt, and H. L. Trumbull, J. Am. Chem. Soc. *78*, 1669-1675 (Apr. 20, 1956).
101. "Polymerization of acrylonitrile in dimethylformamide," by P. F. Onyon, Trans. Faraday Soc. *52*, 80-88 (Jan. 1956).
102. "Titration of basic copolymers of acrylonitrile in nonaqeous solution," by C. A. Streuli, Analytical Chem. *27*, 1827-1829 (Nov. 1955).
103. "Alkyl thiolacrylates: Their preparation and polymerization," by C. S. Marvel, S. L. Jacobs, W. K. Taft, and B. G. Labbe, J. Polymer Sci. *19*, 59-72 (Jan. 1956).
104. "Records by the millions," Modern Plastics, *34*, 152-154, 273 (Oct. 1956).
105. "Why frames of extruded acetate?" Modern Plastics *33*, 106-109 (May 1956).
106. "Cellulose propionate molding compounds," by D. A. Jones, SPE J. *12*, 36-38 (Aug .1956).
107. "A new polymer-coated cellophane," by E. Hartshorne and L. E. Simeri, Modern Packaging *29*, 139-143 (Jan. 1956).
108. "Weathering of ethylcellulose plastic," by M. Chamberlain, R. A. DeLap, and C. L. Stacy, Ind. Eng. Chem. *48*, 1209-1211 (July 1956).
109. "Burning behavior of some cellulose ester film compositions," by C. J. Malm, N. G. Baumer, and G. D. Hiatt, Ind. Eng. Chem. *47*, 2521-2523 (Dec. 1955).
110. "Properties and applications of butyrate pipe," by L. W. A. Meyer and R. J. Scogin, Plastics Tech. *2*, 382-387, 402 (June 1956).
111. "New plastic coating for printing finishing," by H. E. Crawford, Jr., Paper Trade J. *140*, 24 (Mar. 26, 1956).
112. "Illusion of motion in plastics," Modern Plastics *33*, 110-111 (May 1956).
113. "Composite film and pressboard for electrical insulation," by R. Snadow and W. H. Parriss, Plastics (London) *21*, 59-61 (Feb. 1956).
114. "Effect of molecular weight distribution on the creep behavior of cellulose acetate," by D. L. Swanson and J. W. Williams, J. Applied Phys. *26*, 810-815 (July 1955).
115. "Thermal degradation of wood and cellulose," by A. J. Stamm, Ind. Eng. Cnem. *48*, 413-417 (Mar. 1956).
116. "Sizing pipe for flow of cellulose acetate solutions," by F. L. Symonds, A. J. Rosenthal, and W. H. Shaw, Ind. Eng. Chem. *47*, 2463-2466 (Dec. 1955).
117. "Methylation of secondary cellulose acetate with diazomethane," by L. Rebenfeld and E. Pascu, J. Polymer Sci. *21*, 273-277 (Aug. 1956).
118. "Polyethylene—past and future," by G. W. Jargstoff and G. F. Kirkpatrick, SPE J. *12*, 25-27 (June 1956).
119. "Linear polyethylene," by W. C. Goggin, T. B. Thayer, and G. W. Cheney, Canadian Plastics *1956*, 42, 44, 48, 50 (Apr.).
120. "HD polyethylene plastic," Chem. Eng. News *34*, 1470, 1475 (Mar. 26, 1956).
121. "Plain talk on polyethylene," by W. C. Goggin, G. B. Thayer, and G. W. Cheney, Plastics Tech. *2*, 85-88, 108 (Feb. 1956).
122. "Rigid heat-resistant polyethylenes," by J. B. Campbell, Materials and Methods *42*, 88-91 (July 1955).
123. "Will the polyethylene gamble pay off?" by E. S. Childs, SPE J. *11*, 11-13, 36, 38, (Oct. 1955).
124. "Marlex catalyst systems," by A. Clark, J. P. Hogan, and W. C. Lanning, Ind. Eng. Chem. *48*, 1152 (July 1956).
125. "Molecular structure of Marlex polymers," by D. C. Smith, Ind. Eng. Chem. *48*, 1161-1164 (July 1956).
126. "Properties of Marlex 50 ethylene polymer," by R. V. Jones and P. J. Boeke, Ind. Eng. Chem. *48*, 1155-1161 (July 1956) .
127. "King-size moldings," Modern Plastics *34*, 123-128, 258, 260, 263 (Oct. 1956).
128. "Film on the farm," Modern Plastics *34*, 112-116, 233-234, 236, 238 (Sept. 1956).
129. "Polyethylene fibers face brighter future," Modern Plastics *34*, 132-135 (Dec. 1956).
130. "Fabrics with depth," Modern Plastics *33*, 226 (Apr. 1956).
131. "Hard-wearing monofilaments replace traditional materials," Brit. Plastics *29*, 316-321 (Sept. 1956).
132. "The first lined poly tubes," Modern Packaging *29*, 84-85, 219 (Feb. 1956).
133. "The first boilable film bag," Modern Packaging *29*, 174-175, 371 (Mar. 1956).
134. "Polyethylene bottle deformation," by P. J. Carter and W. C. Griffin, Modern Packaging *29*, 166-170. 233-234 (Sept. 1955).
135. "Drums don a poly coat," Chem. Week *78*, 57-58 (May 12, 1956).
136. "Polyethylene bids for polish role," Chem. Week *78*, 49-50 (June 23, 1956).
137. "Better than rubber," Modern Plastics *33*, 199 Mar. 1956).
138. "Performance factors in injection-molded polyethylene domestic ware," by A. B. Glanvill, Plastics (London) *21*, 264-266 (Oct. 1956).
139. "Rice protection," Modern Plastics *33*, 205 (Mar. 1956).
140. "Polyethylene pipe for pest control," Modern Plastics *34*, 222 (Dec. 1956).
141. "Extruding high-density polyethylene." Brit. Plastics *29*, 260-261 (July 1956).
142. "Preheating polyethylene and impact polystyrene prior to extrusion," by P. Wilton and F. D. Marrow, Plastics Tech. *2*, 158-165, 178 (Mar. 1956).
143. "Mold temperature effects in polyethylene molding," by C. S. Imig, Modern Plastics *34*, 149 (Dec. 1956).
144. "Not as easy as it looks," Modern Plastics *34*, 129-131 (Dec. 1956).
145. "Making polyethylene printable," Canadian Plastics *1955*, 42-45, 48 (July).
146. "Improvement of bonding properties of polyethylene," by K. Rossman, J. Polymer Sci. *19*, 141-144 (Jan. 1956).
147. "Molten-bead heat sealing," Modern Plastics *34*, 163-165 (Oct. 1956).
148. "Grading of polyethylene by ZST test," by H. S. Kaufman and C. O. Kroncke, Modern Plastics *33*, 167, 254-255 (Mar. 1956).
149. "Measurement of the molecular weight of polyethylene by ebulliometry," by H. Smith, Trans. Faraday Soc. *52*, 402-409 (Mar. 1956).
150. "Viscosity measurements on molten polyethylene," by W. Philippoff and F. H. Gaskins, J. Polymer Sci. *21*, 205-222 (Aug. 1956).
151. "Fractionation of polyethylene," by L. H. Tung, J. Polymer Sci. *20*, 495-506 (June 1956).
152. "Oxidative degradation of polyethylene," by H. C. Beachell and S. P. Nemphos, J. Polymer Sci. *21*, 113-124 (July 1956).
153. "Oxygen uptake of polyethylene at elevated temperatures," by J. E. Wil-

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Abstracts from the world's literature of interest to those who make or use plastics or plastics products. For complete articles, send requests direct to publishers. List of addresses is at the end of Plastics Digest.

General

Radiation damage to elastomers, plastics, and organic liquids. C. G. Collins and V. P. Calkins. General Electric Co., Atomic Products Division (Sept. 1956). When materials are subjected to an environment of nuclear radiation, their properties are changed in ways that could not necessarily be anticipated from previous experience with changes produced in nonradiation environments; therefore, materials must be reexamined to assess their suitability for nuclear engineering applications. Many experimental measurements of these changes have been made, but because the basic processes involved in radiation-induced changes are not yet completely understood, it has not been possible to answer in utmost detail all of the questions engineers ask about materials. In many instances, however, the questions can be answered on an approximate basis with sufficient accuracy to determine the extent of a radiation damage problem and to aid in the selection of materials. A collection of the available data on radiation damage to materials that is of value for engineering purposes is presented. In order that the data will be directly useful, an attempt is made to generalize, categorize, and evaluate the data, to reduce dosages to a common basis, and to provide a means of converting dosages so that the observed damage can be compared with that which will occur in an anticipated application. The data are presented principally in the form of tables and graphs assembled into individual sections—Elastomers, Plastics, and Organic Liquids. The data are preceded by a section devoted to a general discussion of preliminary considerations, including important factors in radiation damage to organic materials, and the basis and limitations of the dosage conversion procedure. (Available from Office of Technical Services, U. S. Department of Commerce, Washington 25, D. C.)

Materials

Uniaxial stretching of low-pressure polyethylene at various temperatures. K. Richard and E. Gaube. Kunststoffe *46*, 262-69 (June 1956). The physical properties of low-pressure polyethylene in short-time tests are reported. The stress-strain diagrams at room and at elevated temperatures of unstretched material are discussed. Depending on the temperature at which the material is stretched it was found that uniaxial stretching at room temperature increased the tensile strength by about 300% and the modulus of elasticity from 8000-10,000 kg./cm². to 26,000 kg./cm². Stretching at temperatures above the melting point of the crystallites decreased the physical properties.

Characteristics of biaxially stretch-oriented acrylics. D. A. Hurst. SPE J. *12*, 18-27, 35 (May 1956). Tests were conducted to determine the effects of biaxial stretching up to 100% on the properties of cast polymethyl methacrylate. It was found that: the stress-solvent crazing resistance increased with increase in percent stretch; outdoor weathering for six months reduced the craze resistance; the unnotched Izod impact strength increases with increase in percent stretch; the shear strength normal to the plane of the sheet is unaffected by stretching, whereas the shear strength parallel to the plane of the sheet may show reduction to as much as 50% of the unstretched material; the notch sensitivity of acrylic sheet is significantly reduced with even low degrees of stretching; the resistance to crack propagation is increased by stretching but not affected by rates of stretching up to 2.5 in./min., by temperature of stretch at these rates, or by a simulated warm-forming cycle.

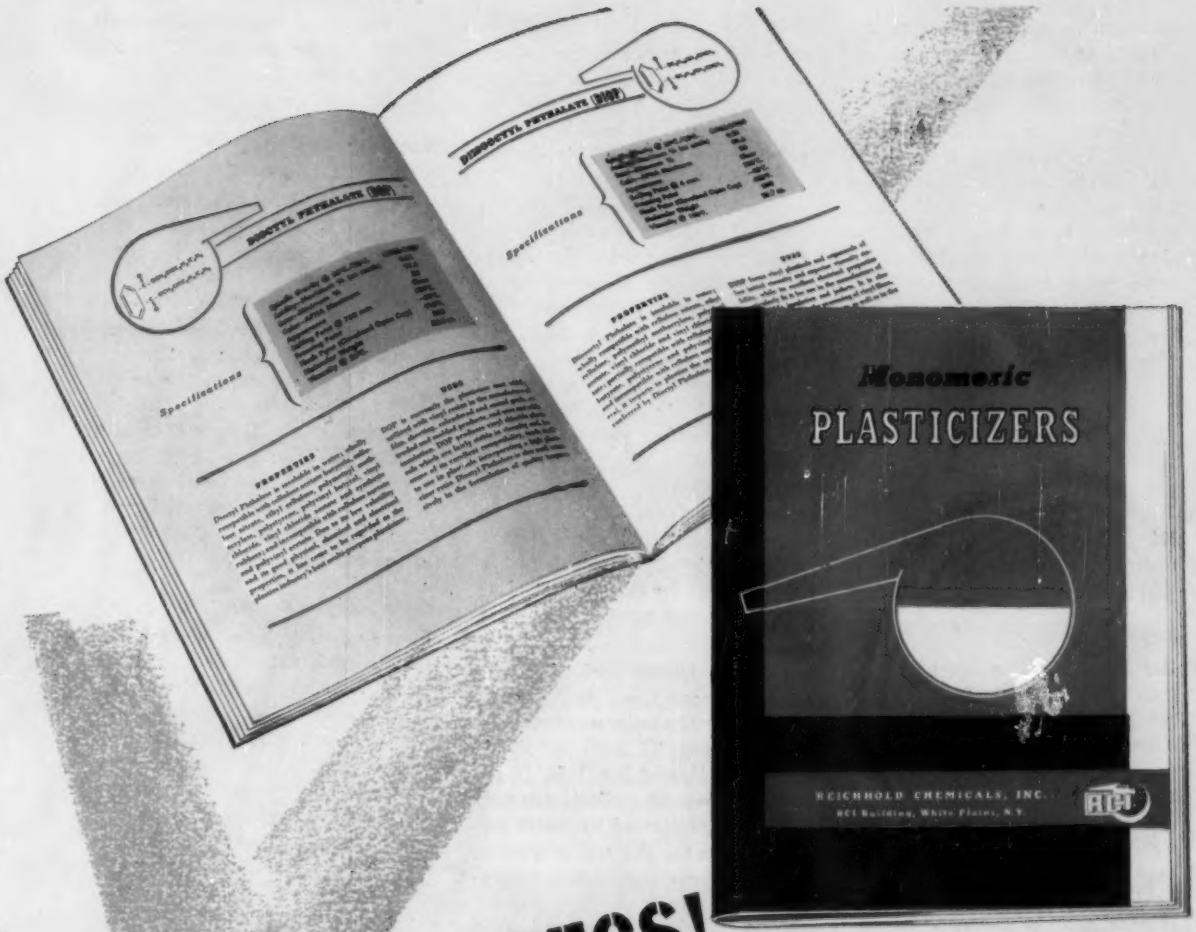
Bonding qualities of Teflon improved. Materials & Methods *43*, 118-19 (Apr. 1956). A new treatment that permits Teflon to be bonded to other materials is described. Tensile, shear, and peel strengths of the bonds are the best yet attained. The method is applicable to section thicknesses down to about 0.005 inch. The treatment consists of chemically etching the Teflon surface by immersion in a 1% solution of metallic sodium in liquid anhydrous ammonia for a period of 1 to 5 sec., followed by a cold water quench to remove residual sodium hydroxide. The etched surface permits adhesives to form a mechanical bond between the Teflon and virtually any bondable material. The material is expected to find application wherever the characteristics of Teflon are required on the surface of another material.

Some chemical aspects of urea-formaldehyde wood adhesives. J. A. Ross. Plastics Inst. Trans. and J. *24*, 278-92 (July 1956). Hardeners for use as fortifying agents and anti-crazing agents in urea-formaldehyde adhesives for bonding wood are reviewed in detail.

Molding and fabricating

How gummed tape manufacture is controlled by isotope inspection. H. E. Carlson. Paper Trade J. *140*, 22-23 (Apr. 23, 1956). A radioactive process for the continuous measurement of the weight per unit area of adhesive coating on gummed tape is described. The adhesive-coated paper passes through a U-shaped metal frame

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having a beta-ray source on the lower arm and a detector on the upper arm. The amount of beta-ray penetration will vary inversely with the mass of the sheet passing between the source and the detector, so that fundamentally the gage measures weight per unit area. The continuous close control thus possible eliminates wasted adhesive, reduces the amount of material rejected for lightweight coating, and greatly increases the uniformity of the finished product.

Production and application of hard-nickel electroformed molds and dies. P. Spiro. Plastics Inst. Trans. and J. *24*, 267-77 (July 1956). The method of making and uses of hard-nickel electroformed dies are reviewed.

Applications

Battery acid in a bag. Modern Packaging *29*, 110-11, 255 (May 1956). Sulfuric acid, which is the electrolyte for the "dry charged" type of battery, is being shipped in a container consisting of a double polyethylene bag within a metal-end fiber canister. In this type of battery, the electrolyte is held separately until the battery is installed.

Some problems affecting the use of plastics in high speed aircraft. M. G. Church. Plastics Inst. Trans. and J. *24*, 235-49 (July 1956). Problems concerned with the use of plastics in aircraft are discussed. These include rain erosion, aerodynamic heating, transparent enclosures, materials for radomes, surface materials, sandwich cores, and inorganic polymers.

Properties

Gas permeability of plastics film. I. Accuracy and sensitivity of the measurements. II. A highly sensitive new instrument. W. Schrüfer. Kunststoffe *46*, 143-147; 270-273 (Apr.; June 1956). Equations are developed for the accuracy of measurement, of recording, and of reading the values of an instrument that measures the gas permeability of a plastic film from changes in pressure or volume. Data are in good agreement with the theory. The equations show that the accuracy of the determinations depends on the volume that the instrument is designed to measure. The permeability of very dense films can be determined quite accurately in the apparatus when the volume to be measured is kept small. On the basis of this theory a new instrument was constructed for determining the gas permeability of plastic films and papers coated on one side. It measures rates between 0.005 and 50 $cm^3./ dm.^2$, 24 hr., atm. Dry gases must be used to obtain maximum accuracy. No rubber gaskets are allowed because the adsorption of gases, especially of CO_2, by rubber is so high that inaccurate results would be obtained. The instrument is so simple that it is also suitable for making tests during production runs.

Effects of tensile preloading and water immersion on flexural properties of a polyester laminate. R. L. Youngs. U. S. Forest Products Lab. Report No. 1856, 18 pp. (June 1956). The effect of tensile preloading followed by water immersion on the flexural properties and water absorption of a typical polyester laminate was determined. Specimens were cut from a parallel-laminated 181 Volan A polyester laminate and subjected to various tensile loads. They were then tested in flexure after being exposed, either while stressed or unstressed, to normal conditions or to various periods of water immersion. Preloading and water immersion appeared to affect flexural properties independently. Preloading tended to lower the modulus of elasticity and modulus of rupture and to raise the proportional limit stress. Although preloading produced statistically noticeable effects on most flexural properties, the effect was so small as to be of little or no practical significance. Immersion in water for 30 days lowered the proportional limit stress and modulus of rupture, but did not significantly affect the modulus of elasticity. Preloading significantly increased the rate of water absorption by immersed specimens, but neither the additional moisture absorbed in 30 days by preloaded specimens nor the additional moisture absorbed by all specimens after 60 or 90 days appeared to significantly affect flexural properties.

Testing

Ultrasonic inspection by pulsed transmission. R. E. Seaman. Brit. Plastics *29*, 262-64 (July 1956). Ultrasonic equipment, believed to be the only satisfactory one in use at the present time for detecting flaws in plastics moldings, is described. This apparatus can detect air inclusions of the order of 0.005-in. diameter in a thickness of 3 inches. It is anticipated that inspection can be carried out on large and small moldings and tubes, on adhesion between bonded surfaces, on glass-reinforced materials, etc.

Chemistry

Chemical activity of gamma-irradiated polymethyl methacrylate. L. A. Wall and D. W. Brown. J. Research Nat. Bur. Standards *57*, 131-36 (Sept. 1956). In studies of polymerization and depolymerization with γ-irradiated polymethyl methacrylate, effects were observed indicative of long-lived free radicals in the solid polymer. With a dose of 10^7 roentgens, the free-radical concentration, as measured by both types of experiments, is estimated to be at least 10^{-5} mole per liter. When irradiated in air the polymer contains peroxide structures of at least 10^{-3} mole per liter concentration. The decomposition of these peroxide groups is accelerated by *tert*-butyl catechol and is associated with the production of scissions in the polymer chain.

Publishers' addresses

British Plastics: Iliffe and Sons, Ltd., Dorset House, Stamford St., London S. E. 1, England.

Electrical Manufacturing: The Gage Publishing Co., 1250 Sixth Ave., New York, N. Y.

Journal of Polymer Science: Interscience Publishers, Inc., 250 Fifth Ave., New York 1, N .Y.

Journal of Research of the National Bureau of Standards: Superintendent of Documents, Government Printing Office, Washington 25, D. C.

Kunststoffe: Karl Hanser Verlag, Leonhard-Eck-Strasse 7, Munich 27, Germany.

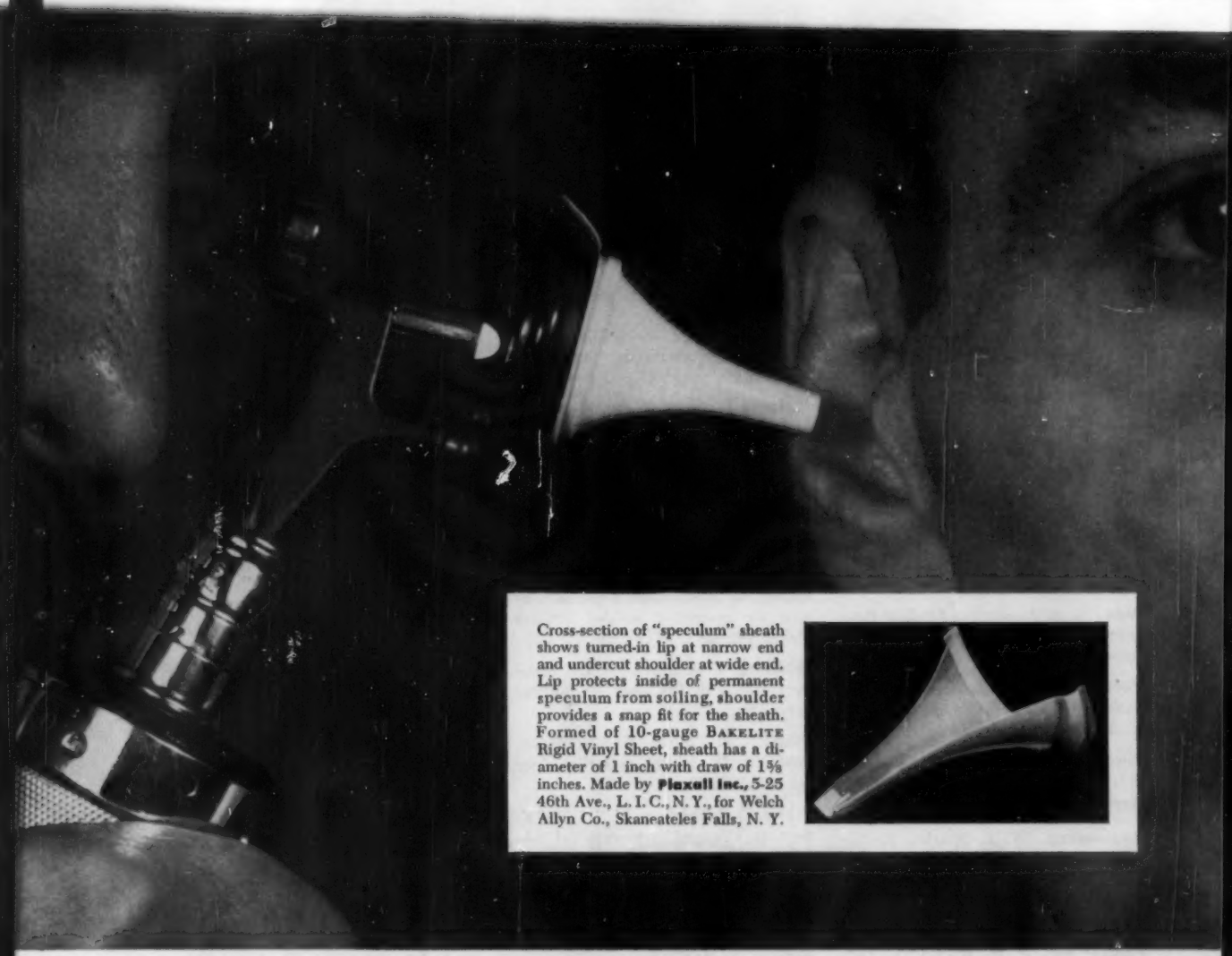
Materials and Methods: Reinhold Publishing Corp., 430 Park Ave., New York 22, N. Y.

Modern Packaging: Modern Packaging Corp., 575 Madison Ave., New York 22, N. Y.

Paper Trade Journal: Lockwood Trade Journal Co., Inc., 15 W. 47th Street., New York 36, N. Y.

Plastics Institute Transactions and Journal: The Plastics Institute, 6 Mandeville Place, London W. 1, England.

SPE Journal: Society of Plastics Engineers, Inc., 513 Security Bank Bldg., Athens, Ohio.



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Copies of these patents are available from the U.S. Patent Office, Washington, D. C., at 25¢ each

Polymers. T. J. Suen and A. M. Schiller (to American Cyanamid). U. S. 2,761,834 and 2,761,856, Sept. 4. Sulfonated methylolacrylamide polymers and copolymers.

Conductive plastics. M. A. Coler. U. S. 2,761,849 and 2,761,854, Sept. 4. Conductive plastics.

Copolymers. W. J. Taat (to Naamloze Vennootschap Scado). U. S. 2,761,850, Sept. 4. Linseed oil—styrene copolymers.

Wax. M. A. Joanen (to Sinclair Refining). U. S. 2,761,851, Sept. 4. Wax-polyethylene composition.

Polymer. W. Lehmann and H. Rinke (to Farbenfabriken Bayer). U. S. 2,761,852, Sept. 4. Polyureas.

Fibers. G. E. Ham (to Chemstrand). U. S. 2,761,855, Sept. 4. Polymeric vinyl chloride compositions.

Packaging. W. J. Sparks, R. G. Newberg, and F. P. Baldwin (to Esso). U. S. 2,762,504, Sept. 11. Packaging hydrocarbon polymers in polyethylene film.

Packaging. R. H. Michel (to Du Pont). U. S. 2,762,720, Sept. 11. Heat-shrinkable plastic packaging material.

Laminate. J. Werner and R. Steckler (to General Aniline) U. S. 2,762,735, Sept. 11. Glass fiber bonded with N-vinyl pyrrolidene allyl ester copolymer.

Plastic sheet. O. N. Foust and E. G. Seems (to United Shoe Machinery). U. S. 2,762,784, Sept. 11. Porous sheet of polyvinyl chloride and a copolymer of butadiene-acrylonitrile.

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Polymerization. C. R. Greene (to Standard Oil). U. S. 2,762,790, Sept. 11. Polymerization of conjugated diolefins.

Polymerization. D. C. Pease and M. J. Roedel (to Du Pont). U. S. 2,762,791, Sept. 11. Ethylene polymerizations.

Batteries. R. E. Wood (to U. S.). U. S. 2,762,858, Sept. 11. Battery including a sheet of conductive plastic.

Molding. H. H. Holly (to Hollymatic). U. S. 2,763,026, Sept. 18. Device for removing molded articles from a mold.

Molding. R. A. Blake (to U. S. Rubber). U. S. 2,763,028, Sept. 18. Molding apparatus.

Film. R. E. Tulloss. U. S. 2,763,029, Sept. 18. Producing optically clear polyethylene film.

Films. D. R. Erickson. U. S. 2,763,030, Sept. 18. Films of hydroxy alkyl cellulose.

Molding. H. G. Fay (to U. S.) U. S. 2,763,032, Sept. 18. Injection molding around inserts.

Cellulose derivatives. L. W. A. Meyer and M. H. Broyles (to Eastman Kodak). U. S. 2,763,562, Sept. 18. Cellulose acetate butyrate containing 3-methoxy butyl myristate.

Fibrous glass article. L. P. Biefeld (to Owens-Corning). U. S. 2,763,573, Sept. 18. Resin-bonded fibrous glass article.

Leather treatment. P. L. Lawler. U. S. 2,763,577, Sept. 18. Impregnating leather with resinous materials.

Reinforced resins. I. L. Newell (to United Aircraft). U. S. 2,763,624, Sept. 18. Polyester polyisocyanate resins reinforced with fibers containing carbonamide groups.

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Stabilized resins. E. W. Johnson (to Metal and Thermit). U. S. 2,673,632, Sept. 18. Organotin oxide-ester reaction products as stabilizers for vinyl chloride resins.

Resins. H. A. Gray (to Monsanto). U. S. 2,763,633, Sept. 18. Vinyl acetate resins.

Resins. A. S. Teof (to Dow). U. S. 2,763,634, Sept. 18. Alkenyl aromatic resins and methods of sulfonating them.

Polyacrylonitrile. C. W. Davis (to Dow). U. S. 2,763,636, Sept. 18. Controlling molecular weight of polyacrylonitrile.

Sheet. S. Mito, E. Takenchi, and N. Fukuoka (to Shibata Gamu Kogyo). U. S. 2,763,759, Sept. 18. Apparatus for electro-perforating a sheet of polymeric material.

Resins. T. J. Mika and R. D. Sullivan (to Shell). U. S. 2,764,497, Sept. 25. Resins plasticized with epoxidized long chain esters.

Plasticizing. C. Diamond. U. S. 2,764,498, Sept. 25. Plasticizing cellulose derivatives.

Adhesion promotion. C. L. Emerson, Jr. (to Emerson and Cuming). U. S. 2,764,502, Sept. 25. Improving adhesion to polyamides and polyesters by treating with alkaline solutions.

Coating. F. L. Kilbourne, Jr. and T. S. Moroney (to Connecticut Hard Rubber). U. S. 2,764,505, Sept. 25. Coating silicone rubber with polytetrafluoroethylene.

Composite. J. A. Piccard (to Du Pont). U. S. 2,764,506, Sept. 25. Impregnating fibrous material with tetrafluoroethylene polymer.

Film treatment. Y. Jen and W. M. Wooding (to American Cyanamid). U. S. 2,764,507, Sept. 25. Treatment of cellulose film with a methylolcarbamyl polyazaalkane resin.

Paper coating. D. D. Ritson and J. C. Pullman (to American Cyanamid). U. S. 2,764,509, Sept. 25. Hot melt coating for paper.

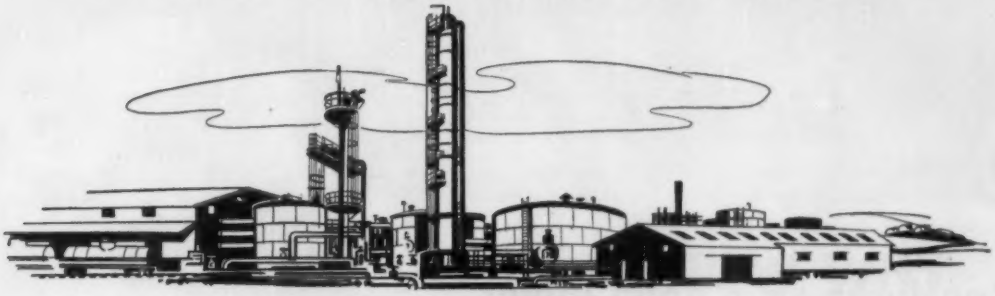
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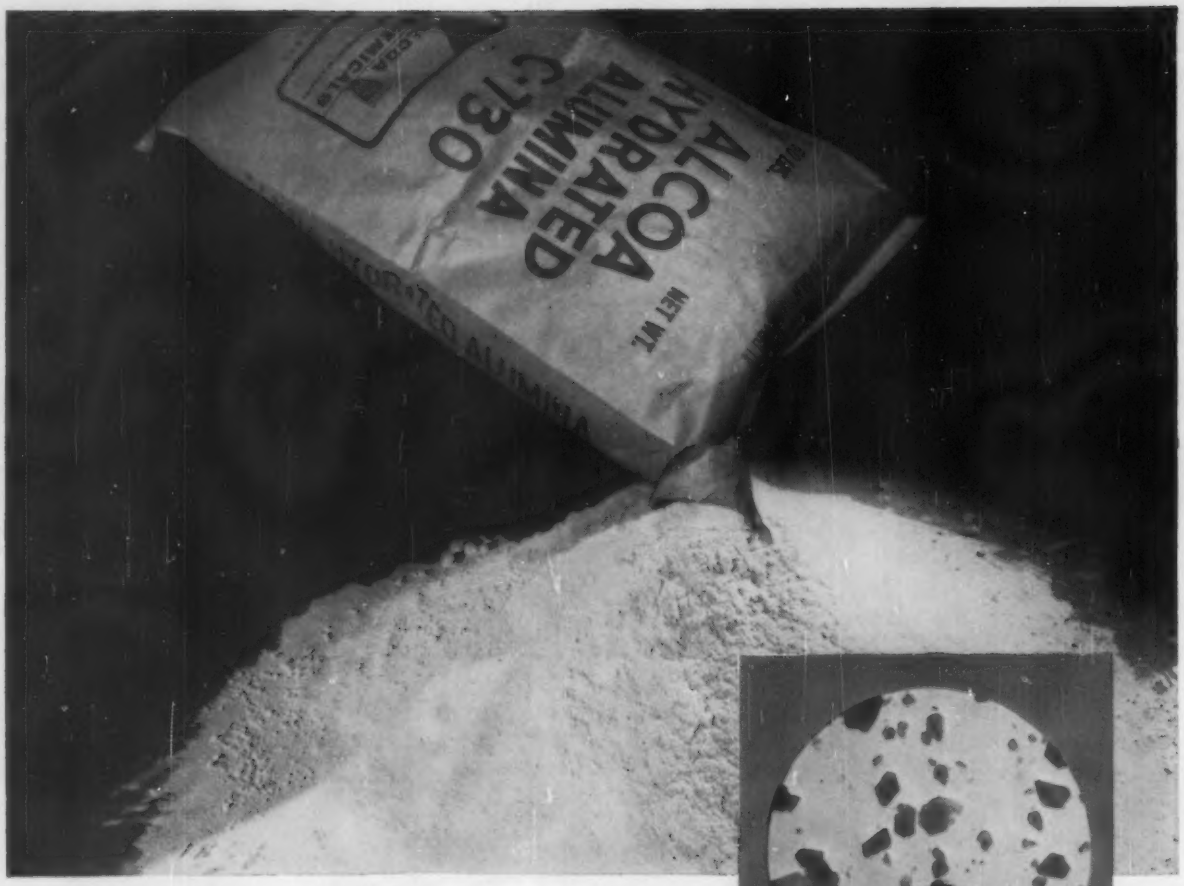
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Celanese CHEMICALS

U. S. 2,764,559, Sept. 25. Polyethers



Spotlight on a good mixer...

ALCOA HYDRATED ALUMINAS SERIES C-700

This electron microscope photograph of Hydrated Alumina C-730 (magnification 25,000X) shows fineness of particles. Average number diameter is 0.06.

Fine particle size, uniformity, good mixing characteristics and substantial chemical neutrality make ALCOA Hydrated Aluminas Series C-700 outstanding general-purpose pigments. As fillers, coatings, reinforcing pigments and even mild abrasives, they improve the quality of such varied products as natural and synthetic rubbers, plastics, fine coated papers, cosmetics, paints and varnishes, adhesive tapes, cleaners and polishers.

Used as reinforcing pigments in natural and synthetic rubber, Hydrated Aluminas Series C-700 impart high tensile strength, tear resistance and modulus along with good resiliency. They mix easily and rapidly with rubber compounds—with relatively little sticking to the mixing equipment. Their dispersion is excellent.

As a paper coating pigment, Hydrated Alumina C-730 gives a coating of great brightness, opacity and gloss with a high degree of whiteness. Ink receptivity is high for the degree of gloss obtainable.

Equally desirable physical characteristics are obtained when Hydrated Aluminas Series C-700 are used as a filler in plastics, particularly vinyls . . . as pigments in casein paints . . . as a relatively soft, extremely fine abrasive in special polishing applications . . . or as a very fine, soft filler or base for cosmetic powders.

If *you* have need of an outstanding general-purpose pigment for *your* products, it will pay you to investigate ALCOA Hydrated Aluminas Series C-700. You'll find their contributions to better products often cost less than pigments you now use. Get complete information by writing ALUMINUM COMPANY OF AMERICA, 709-A Alcoa Building, Pittsburgh 19, Pennsylvania.

ALCOA CHEMICALS
ALUMINUM COMPANY OF AMERICA

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ALTERNATE SUNDAY EVENINGS

U. S. 2,764,559, Sept. 25. Polyethers from 1,5-epoxycyclohexane.

Resins. J. K. Hubbard (to Du Pont). U. S. 2,763,630, Sept. 18. Poly p-xylenes plasticized with chlorinated biphenyl.

Polymers. H. W. Coover, Jr. and J. B. Dickey (to Eastman Kodak). U. S. 2,763,631, Sept. 18. Acrylonitrile polymers containing vinyl chloride or vinylidene chloride.

Resins. E. L. McMaster and H. Tolkmith (to Dow). U. S. 2,764,560-1-2-3-4, Sept. 25. Resinous products from hexaalkylphosphinous triamides and chloromethylated vinyl aromatic copolymers.

Plastics. P. Hoppe, E. Weinbrenner, C. Muhlhausen, and K. Breer (to Farbenfabriken Bayer). U. S. 2,764,565, Sept. 25. Polyurethane plastics.

Cellular compositions. E. Simon and F. W. Thomas (to Lockheed). U. S. 2,764,566, Sept. 25. Polyisocyanate, alkyd resin, polymethylol phenol composition.

Copolymers. E. J. Kowolik and J. W. Fisher (to British Celanese). U. S. 2,764,570, Sept. 25. Copolymers of acrylonitrile with dicarboxylic acid hydrazines.

Polymers. R. S. Montgomery (to Dow). U. S. 2,764,571, Sept. 25. Vinyl chloride polymers plasticized with glycol dibenzoates.

Resins. G. Widmer and P. Zuppinger (to Ciba). U. S. 2,764,574, Sept. 25. Aminotriazine-formaldehyde condensates.

Resins. R. Kohler and H. Pietsch (to Henkel). U. S. 2,764,575, Sept. 25. Resins from oxacyclobutane compounds and dicarboxylic acids.

Resins. B. Blaser, M. Rugenstein, and G. Tischberek (to Henkel). U. S. 2,764,576, Sept. 25. Water-soluble sulfonated styrene polymers.

Copolymers. A. L. Barney (to Du Pont). U. S. 2,764,578, Sept. 25. Vinyloxyalkyl quaternary ammonium copolymers.

Polymerization. D. E. Seymour (to U. S. Rubber). U. S. 2,764,579, Sept. 25. Ethyl bromomalonate modified for polyvinyl chloride.

Extrusion. H. Reifenhauser (to Hugo Stinnes). U. S. 2,764,780, Oct. 2. Multiple screw extruding press.

Coating. F. Whittier and R. J. Lawn (to Pittsburgh Coke and Chemical). U. S. 2,765,288, Oct. 2. Coating containing coal tar pitch and an epoxy ether resin.



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Company _____

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Product _____

New Machinery and Equipment*

Slitter-rewinder

The Cameron 550 is said to be a low-cost, center-winding machine that will handle a variety of materials including plastic films, foils, paper, textiles, and laminates. It can be equipped with whatever type slitting elements are best for the material being processed. Available in sizes to handle films ranging from 32 to 62 in. wide, the machine can rewind rolls up to 15 in. in diameter at speeds up to 500 ft./min. Rewind rolls are alternately staggered on two separate shafts, making for clean wind-up. *Cameron Machine Co., 61 Poplar St., Brooklyn 1, N. Y.*

Sheet glazer

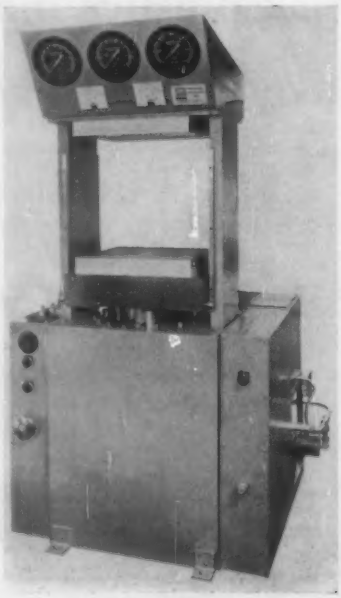
Designed to impart gloss and improve the physical characteristics of thermoplastic sheets, the sheet glazer is most conveniently used in conjunction with an extrusion train. The underside of the sheet is chilled as the sheet moves on liquid-cooled rollers while the top face is radiantly heated to the flow temperature. Over-all length of the unit is 50 in., and the maker will build it to handle any sheet width desired, at any height from the floor. A Stirling temperature control unit for the coolant, which is circulated at about 15 g.p.m., is built in. The rollers are powered by a Dynamatic variable speed drive. *Goulding Mfg. Co., 2929 River St., Saginaw, Mich.*

Combination folder and creaser

The Thermatic 178 is designed for both folding and creasing of thermoplastic sheet in the size range from 5 to 20 mils. It forms the right-angle creases used in making boxes as well as 180° folds used in making card holders, page protectors, etc. Most thermoplastic materials can be folded on fast cycles by adjusting blade temperature and folding speed. Maximum length of folds is 30 inches. Dual folds or creases can be made without removing the work-piece from the machine. A typical cycle is about 2 sec. on 5- to 10-mil material in folding, 1 sec. on creasing. When used as a folder, the machine requires a small-volume air supply at about 80 p.s.i. *Taber Instrument Corp., 111 Goundry St., N. Tonawanda, N. Y.*

Versatile compression press

Designed to provide a wide range of experimental pressing conditions, a new PHI 300-ton press offers three high-pressure ranges: 0 to 10 tons, 0 to 60 tons, and 0 to 300 tons. Each range is provided with its own gage, so that any ram force from 1000 to 600,000 lb. can be maintained with high accuracy. Two built-in, dual-scale pyrometers indicate the temperatures of the heated platens. While steam-heated platens are standard with the machine, electrically heated platens for use at temperatures up to 900° F. may be had. The instruments are all grouped in the front of the machine and mounted at a convenient viewing angle. Safety devices protect the lower-pressure instruments against damage at higher pressures, and check the ram speed before final closing. Closing speed is 20 in./min., maximum daylight is 20 inches *Pasadena Hydraulics, Inc., 273 North Hill Ave., Pasadena, Calif.*



Pasadena Hydraulic 300-ton press has three ranges

Multi-color extrusion

An auxiliary extruder with a screw 1.25 in. in diameter by 12 in. long is especially designed to provide a small sidestream of melt of a second color in an extrusion where the main stream is furnished by a bigger machine. The machine can be raised or lowered by hand crank to supply the auxiliary stream at the most convenient point relative to the main stream. Several such auxiliaries can be used to achieve many-color effects. Such products as multi-color welting, belting, tubing, wire-coating, etc., are easily made with the aid of one or more of these little auxiliaries. The extruder is powered by a ¾-hp. motor with a speed range of 7 to 55 r.p.m., and is heated by three band heaters of 1.2 kw. total capacity. The maker will also supply dies to fit the customer's main extruder that will combine side stream(s) with main stream to get the desired effect. *Thermoplastic Processes, Inc., 1949 Valley Rd., Stirling, N. J.*

Multi-scale portable pyrometer

Pyrotest 9B, a potentiometer pyrometer with nine interchangeable scales, is well adapted to checking and calibrating all types of industrial and laboratory temperature instruments. Operating range, depending on the thermocouple metals being used, is from 32 to 3215° F., corresponding to a millivolt range (in three scales)

*Specifications and claims made and appearing in these pages are those of the manufacturers of the machinery and equipment described and are not guaranteed by MODERN PLASTICS.



MODEL
H-250

Step Up Production with VAN DORN 2½ Oz. Automatic Press

Check these outstanding features of this ultra-modern Van Dorn injection press:—

GREATER CAPACITY— Up to 2½ oz.; smaller pieces at faster cycles.

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FASTER PRODUCTION—Will attain up to 1200 cycles per hour (dry run).

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SIMPLER OPERATION—Due to automatic, adjustable material metering device.

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SELECTIVE CONTROL—Merely throw toggle switch to operate press semi-automatically.

DEPENDABILITY— Because of all-steel construction and Van Dorn's established reputation in the plastics machinery field.

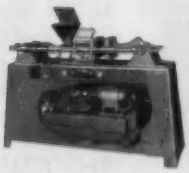
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SEMI-AUTOMATIC PRESS
2-oz. capacity.

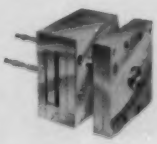


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Grinds up rejects, waste, etc., for re-use.



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Available from stock.

from 0 to 155. Accuracy 0.16% of the scale spans. Accuracy with the 4000-increment, 50.5-in. slidewire is 0.17% of full scale on any particular scale. Dimensions are 12.2 by 9 by 8.5 in.; weight is 14 pounds. *Technique Associates, Inc., 211 E. South St., Indianapolis 25, Indiana.*

Multisheet laminator

Called a surface welding machine by its manufacturer (Dornbusch & Co., Germany), the Rotodorn accomplishes the laminating of up to six low-cost, highly filled sheets with one or two high-grade covering sheets to produce a relatively thick composite, e.g., ⅛-in.-thick vinyl floor tile, or a conveyor belting material. A clear top ply can be printed and fed into the Rotodorn with the print side down, so that the printed surface is protected from wear. The bottom ply may be cloth, and so on. The last step is an embossing nip that can impart any desired textures to the outer surfaces of the laminate. Homogeneous bonding is assured by the method of operation: the surfaces to be welded are passed over large steam-heated drums, then they pass 17-kw. banks of infrared heaters that do the final softening, after which they are squeezed between pinch rolls. The several layers are successively welded in this manner, then the composite is reheated and passed through the embossing (or finishing) rolls, where forces up to 8 tons can be applied. Maximum working sheet width is 63 inches. The driving motors are totally enclosed and equipped with speed regulators. A central lubrication system insures low maintenance, yet the parts most likely to wear may be quickly replaced. *Ringler-Dorin, Inc., 880 Bergen Ave., Jersey City 6, N. J.*

Color tolerance computer

An electronic computer, used with a colorphotometer, computes deviations from color standards and presents the answer as a number on a dial calibrated in National Bureau of Standards units. When a deviation is beyond an acceptable tolerance, the instrument will compute the correction needed to get the true color with a minimum of color adjustments. Range is from 0 to 20 NBS units, with an accuracy of ±0.1 unit. *Instrument Development Labs., Inc., Needham Heights, Mass.*

Solvent for epoxies, polyesters

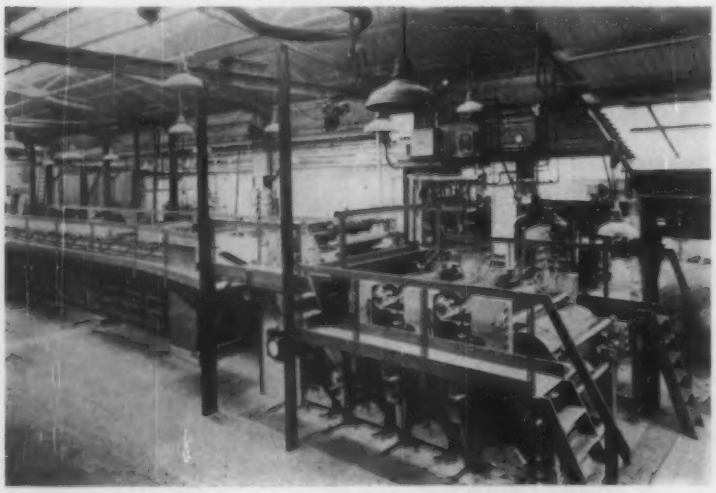
De-Solv 292, a new reclaiming solvent, disintegrates cured epoxy and polyester potting compounds, permitting salvage of electronic components from potted subassemblies in which some of the components have been found to be defective after potting. While this is expected to be the biggest immediate use of the solvent, it should also be useful to anyone who has to remove these resins, e.g., users of epoxy adhesives with short pot lives, reinforced plastics laminators who must clean up excess resin or drippings, and so on. De-Solv 292 can be used repeatedly with systems containing nylon- formvar- and linen-wrapped wire; with all metallic and glass components; and with phenolics. It is noninflammable, neutral, and has low toxicity. *Ram Chemicals, P. O. Box 192, Gardena, Calif.*

Metering dispenser for 2-part resin systems

The Triplematic is a dispensing machine for 2-component, self-curing, flowable resin systems that meters the correct ratio of curing agent and resin, mixes them intimately, and discharges a preselected volume. Model 503-A dispenses from 0.3 ml. to 3 ml. per shot, while Model 520-A has a range from 1 to 20 ml. per shot, at rates up to 72 shots per minute. The mixing chamber may be purged with resin alone to prevent setting up. Resins ranging in viscosity from 3 to 1000 poises and curing agents ranging upwards from 0.5 cp. can be metered in a wide range of ratios. A simple adjustment increases the shot size with no change in ratio. An important feature: no air is occluded in the resin mix. The only utility needed is 115-v. AC. *H. V. Hardman Co., Inc., Belleville 9, N. J.*

Two-color marking machine

The Acromark 9AH is a multicolor hot stamping machine (so far used only with two colors) that can in one operation make multi-color marks on plastics, wood, and painted metal surfaces. A wide range of shapes can be marked. The machine can also be adapted to die-marking of metals. With plastics, the usual output ranges from 800 to 1200 pieces per hour; rates up to 2000 per hour can be reached if the part is easily positioned in and removed from the machine. Over-all dimensions of the 9AH are 5 ft. wide, 2 ft. deep and 4.1 ft. high. Its stroke is 14 inches. Utilities needed: 115-v. a.c. and 125 p.s.i. air. *The Acromark Co., 545 Morrell St., Elizabeth, N. J.*



Dornbusch Rotodorn machine can laminate up to six low-cost sheets with two high-grade covering sheets to produce thick composite





Easy to handle and simple to mould, Deeglas Chopped Glass Fibre Mat provides the *extra* strength needed to make plastic mouldings stronger and lighter. Its wide use in the aircraft, boat building and automobile industries is evidence of its outstanding advantages—even distribution of fibre, constant density and tensile strength in all directions, complete absence of swelling on impregnation. Deeglas is available pre-impregnated with a variety of resins, and is suitable for moulding by either pressure or vacuum methods.



Further details about Deeglas mat will be gladly supplied, along with samples of rovings, chopped fibre, and cloth.

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FOR BETTER MOULDINGS

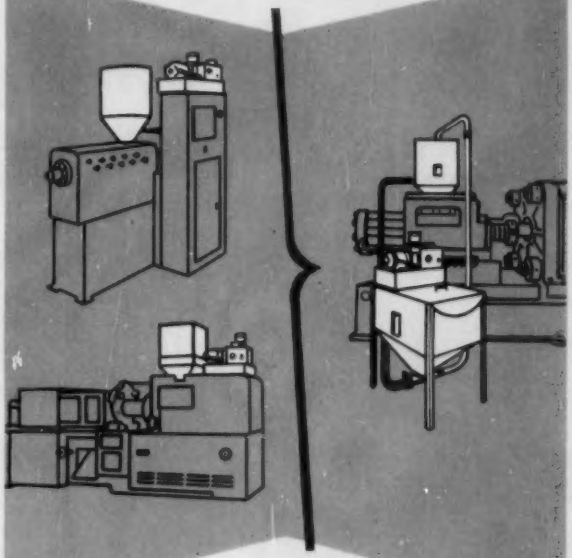
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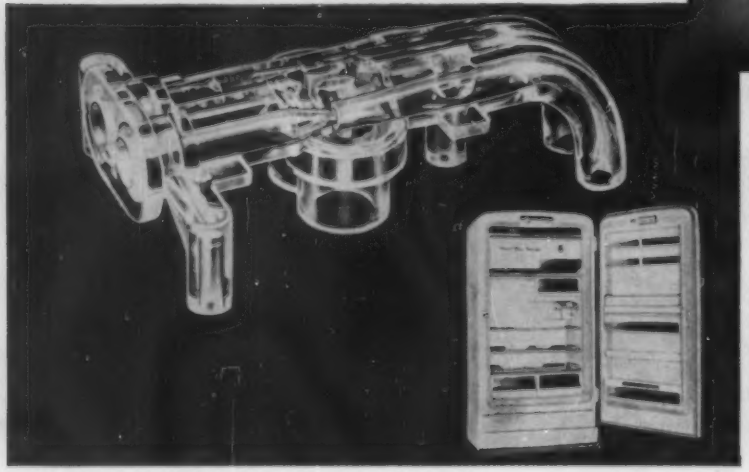
The functional beauty – always



The new branch of the Plainfield Trust Company in Fanwood, New Jersey, incorporates efficient, attractive lighting fixtures of Du Pont LUCITE. The durability, clarity and unique light-transmission properties of LUCITE acrylic resin have made it adaptable to all types of modern lighting installations. (Fixtures of LUCITE by Marlou Lights, Inc., Fanwood, N. J. LUCITE extruded by Plastex Company, Columbus, Ohio.)



Strong, attractive embedments of LUCITE are available for a wide variety of products. Used for instruction or as visual sales aids, embedments of LUCITE resist cracking, chipping and crazing. (Karv Art Products Mfg. Co., Camden, N. J.)



Intricate parts, such as this juice-mixing valve used in the Westinghouse refrigerator, are easily and economically molded of LUCITE. Parts of LUCITE are clear, strong, light in weight and chemically resistant. (Manufactured by the Dole Valve Co., Chicago, Ill. LUCITE molded by Chicago Molded Products Co.)

of Du Pont LUCITE®
an added sales attraction

A WIDE VARIETY OF APPLICATIONS utilize the twin advantages . . beauty and efficiency . . . of Du Pont LUCITE.

Sparkling clear or in a range of brilliant colors, LUCITE is used to beautify such items as household fixtures, personal articles, jewelry and ornaments.

In industrial applications the strength, toughness, transparency, and resistance to chemicals of LUCITE provide many functional advantages.

LUCITE acrylic resin in the "diamond" cut gives processors greater shot-to-shot uniformity of injected molded parts . . . permits higher bulk density packaging for greater utility of warehouse space. "Diamond" cut LUCITE also has a low moisture content and can be processed at higher temperatures without surface blemishes. Formulations of heat resistant LUCITE are now available which permit molding temperatures 30° to 50° F. higher than previously possible with any similar acrylic resin.

The versatility of LUCITE is illustrated in the applications shown here, from colorful dispenser knobs to intricate venturi valves. LUCITE provides economy, durability and efficiency.

Why not evaluate the advantages of LUCITE in terms of your own operation? For more information simply clip and mail the coupon below.



Outdoor fixtures, such as the post lamp above, are easily and economically injection molded of LUCITE. The lamp hood, supports and post adapter will not rust, corrode or deteriorate since they are made of LUCITE. (Cape Codder Post Lamp manufactured by Western Circle Company, Kirkwood, Missouri. LUCITE molded by Engineered Products, Inc., St. Louis, Missouri.)



Eye-catching dispenser knobs made of LUCITE, serve as colorful, point-of-sale reminders. Since aging and moisture have little, if any, effect on LUCITE, these knobs will stay bright and attractive for years. (Knobs manufactured by Clearfloat, Inc., Attleboro, Mass.)



Beverage dispenser bowl of LUCITE is unaffected by chemical action of juices, is easily inspected for cleanliness and refill requirements. (Dispenser manufactured by Dispensers, Inc., Los Angeles, California. LUCITE processed by Peerless Plastics, Culver City, California.)

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Books & Booklets

Write for these publications to the companies listed. Unless otherwise specified, they will be sent gratis to executives who request them on business stationery.

"Handbook of Material Trade Names: Supplement I"

By O. T. Zimmerman and Irvin Lavine

Published in 1956 by Industrial Research Service Inc., Dover, N. H. 383 pages. Price: $12.50 in U.S.A. and $13.50 outside U.S.A.

This supplement to the 1953 edition of the "Handbook of Material Trade Names," which contained descriptions of over 15,000 products manufactured or distributed by over 1500 companies, is, like the parent volume, divided into three sections: 1) the "Trade Name Section" in which products are listed alphabetically and described; 2) the "Classification Section" in which all of the products described in the previous section are classified according to their major uses or composition; and 3) The "Directory Section" which gives the address of each manufacturer or distributor whose products are described, and a list of each company's products for which information is given. In addition, a section entitled "Products Withdrawn From the Market" lists alphabetically all products that are described in the 1953 edition and are no longer available.

"Communication Presentees Au Cours Du Premier Congres Belge De L'Emballage"

Published in 1956 by Institut Belge De L'Emballage, 57a Boulevard Du Jardins Botanique, Brussels, Belgium. 344 pages. Price: 100 Belgian Francs, (ca. $2.00).

The text, in French, of papers presented at the First Belgian Packaging Congress held May 3-5, 1956, is now available in book form. In addition to reports on all types of packaging—from polyethylene to kraft paper to wood, for perishable and non-perishable items—there are descriptions and illustrations of packages that won "Oscars" for being best in the categories of "transport" and "distribution."

"Chemical Engineering Catalog, 1956-57"

Published in 1956 by Reinhold Publishing Corp., 430 Park Ave., New York 22, N. Y. 1932 pages. No charge in the United States and Canada if volume is returned when new edition is published. Price for permanent purchase: $12.50.

The 41st annual edition of this completely indexed reference volume covering the chemical processing industries offers a wealth of descriptive and illustrative material on equipment available from more than 550 manufacturers.

Saw blades. Catalog fully describes company's blades that are now being used in industry. Among these are: plastics blades —for cutting acrylics, ureas, polystyrene, polyethylene, printed circuit boards for electronics applications, and other commercial materials; woodworking blades; graphic arts blades; metalworking blades; building material blades; and other special blades for the cutting of hard and soft rubber, certain softer ceramics, etc. 8 pages. *Forrest Manufacturing Co., Inc., P.O. Box 189, Rutherford, N. J.*

Preimpregnated reinforcements. Technical Data Sheet No. 17 describes Mobaloy MC-5, Mobaloy DF, Mobaloy ER, etc., preimpregnated glass mat with stabilized resin (polyester, diallyl phthalate, epoxy, or phenolic) catalyzed for immediate use. Technical Data Sheet No. 18 describes Cordopreg RC-22, Cordopreg H-165, etc., Mobaloy ER, Mobaloy D, Mobaloy AH, etc., preimpregnated roving fabric with silane sizing available, plain or colored, with any of the following resins: stabilized polyester, diallyl phthalate, epoxy, and phenolic. *Cordo Molding Products Inc., 230 Park Ave., New York 17, N. Y.*

Caustic soda. A 15 by 22 in. chart, "How to Use Caustic Soda Safely," lists personal protective equipment, first aid instructions in the event of contact with the eyes, and for skin irritation, and what to do if taken internally. A space for emergency telephone numbers (doctor, fire, police, and ambulance), is provided on the chart. *Westvaco Chlor-Alkali Div., Food Machinery and Chemical Corp., 161 E. 42nd St., New York 17, N. Y.*

Resins. Revised bulletin describes typical applications, lists properties, and presents data on forming and working Teflon tetrafluoroethylene resin, Zytel nylon resin, Alathon polyethylene resin, and Lucite acrylic resin. A comparative characteristics chart lists chemical, mechanical, electrical, structural, and decorative characteristics for each product. 18 pages. *E. I. du Pont de Nemours & Co., Wilmington, Del.*

Reconditioning units. Bulletin describes various models in the company's line of portable oil and solvent reconditioning units. Types and operation of reconditioning elements is dealt with and information is given on when to change the element. 6 pages. *Mayhew Products Co., 2423 E. 57th St., Los Angeles 58, Calif.*

Mylar adhesives. Bulletin No. 17 discusses adhesives for Mylar polyester film, listing classes (modified synthetic rubber, polyester, and vinyl types), and giving a detailed description of each. 8 pages. *E. I. du Pont de Nemours & Co., Wilmington, Del.*

Servo systems. Bulletin describes and illustrates a number of servo systems, including the

VERSATILE- *Fast Curing . .*

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Count on Pitt-Consol too, for technical assistance on any problem you may have in the use of phenolic resin and molding compounds. Inquiries are also invited for special formulation and color requirements.

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solved these marking problems

imprinting bulky, multi-wall bags

Hand-stamping large, unwieldy shipping bags before filling with raw plastic compounds proved slow, costly and poor in quality. The Markem Method now does it faster and better — using a Markem 25A machine to imprint consecutive lot number, type, color, grade, etc. Quality is excellent, production has doubled.



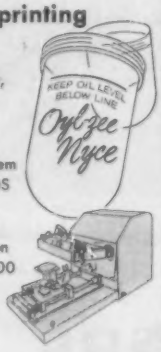
positive identification of TV tubes by manufacturers



Base branding of TV tubes by the manufacturer — with trademark, code number, etc. — must be clear, durable, fast-drying — and match production rates as well. Markem 52A machines answer all these needs, and add the advantage of marking tubes in cartons, on conveyor lines, even those installed in sets.

screen process printing plastic bowls

After using a slow, costly, spray gun-and-stencil method to mark plastic bowls, the manufacturer began screen printing them with the new Markem 90S machine. Two distinct, durable and fast-drying imprints are now made on each bowl, at rates to 600 per hour. Adjustable gauges handle various bowl sizes.



Let the modern Markem Method make your product identification and decoration economical and attractive. Write Markem Machine Co., Keene 20, N. H.

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Servospeed automatic takeup for plastics processing. 23 pages. *Electro Devices, Inc., 4-6 Godwin Ave., Paterson 1, N. J.*

Paneling. The Marlite line of melamine plastic-finished wall and ceiling paneling is illustrated in color and described in a new catalog listing the company's products. 8 pages. *Marsh Wall Products, Inc., Dover, Ohio.*

Christmas decorations. Catalog describes, illustrates, and gives prices for the company's vacuum formed plastics products for Christmas display. 16 pages. *W. L. Stensgaard and Associates, Inc., 346 N. Justine St., Chicago 7, Ill.*

Extrusion and molding. The company's complete service for designing, tooling, producing, and finishing both extruded and molded parts is described and illustrated. 8 pages. *Geauga Industries, Inc., Middlefield, Ohio.*

Mechanically interlocked felts. Technical bulletin discusses Feutron, mechanically interlocked felts for use in the reinforced plastics fields. Its advantages to the low pressure laminate field and its use as overlays in fibrous glass mat products are described. 3 pages. *American Felt Co., Glenville, Conn.*

Heat sealing. Brochure describes thermal impulse heat sealing machinery. A price list and specifications giving the model number, seal length and width, overall dimensions (length, width, and height), wattage during impulse, and shipping weight is included for hand, foot-pedal, and power-operated models. 8 pages. *Vertrod Corp., 2037 Utica Ave., Brooklyn 34, N. Y.*

Temperature controls. The complete line of Thermoswitch temperature controls is described in Catalog MC-135. Literature gives physical specifications, performance data, temperature ranges, etc. Also listed and described are the various modifications and special features such as moisture-proof seals, armored cable, extended shell, and temperature-setting knob and dial which can be supplied to adapt the Thermoswitch to varied service requirements. 6 pages. *Fenwal Inc., Ashland, Mass.*

Insulating material. Design manual analyzes the properties and applications of Mycalex, an insulating material composed of ground mica and a special glass. Nine illustrated case histories are included. 24 pages. *Plastics Dept., Chemical Div., General Electric Co., Pittsfield, Mass.*

Speed reducers. Bulletin No. 98 describes the Bantam Speed Reducers which have a maximum power output of 0.1 h.p. at the low speed shaft. Standard units and units with an anti-backlash feature are described. Each kind is available in over 400 fixed ratios. 4 pages. *Metron Instrument Co., 432 Lincoln St., Denver 3, Colo.*

Wet-blast equipment. Complete descriptive material on its line of manual, semi-automatic, and fully automatic Pressure Blast wet-blast equipment is available in an illustrated catalog. Eighteen pages are devoted to case histories covering a wide range of job applications. Also included are illustrations of the various standard Pressure Blast units available and full details on the type of abrasives employed. 56 pages. *The Cro-plate Co., Inc., 747 Windsor St., Hartford 1, Conn.*

Non-woven fabric. A sample folder and descriptive bulletin on AllFab, a new low-cost, non-woven fabric, gives properties and suggested uses and provides swatches of typical fiber combinations for examination. The folder points out that the thermoplastic resin binder in AllFab makes it possible to electronically "stitch" or heat seal the material, eliminating sewing. *The Felters Co., 210 South St., Boston 11, Mass.*

Rubber. Information is given on the physical properties and processing of Ameripol—a man-made rubber used for tire treads, conveyor or drive belts, typewriter rolls, shoe soles, flooring, etc., and as a blend with natural rubber. Charts analyzing the properties of cold non-oil polymers, cold oil-



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extended polymers, and hot polymers, as well as test recipes and test data are given. 23 pages. *Goodrich-Gulf Chemicals, Inc., 3121 Euclid Ave., Cleveland 15, Ohio.*

Housewares rules. Booklet of "Trade Practice Rules for the Plastics Housewares Industry," promulgated June 22, 1956, is now available. Not included are melamine dinnerware and articles made from thermoplastic film. 11 pages. *Federal Trade Commission, Washington, D.C.*

"Resin Review." Paraplex G-62, a non-toxic plasticizer given FDA approval for food packaging uses; "hammer" finishes; Acrysol ASE-60, a new development in alkali-soluble emulsions; and Acryloid B-66, an improved fume-proof brushing enamel are among the subjects discussed in Vol. VI No. 3 of this series. 27 pages. *Resinous Products Div., Rohm & Haas Co., Philadelphia 5, Pa.*

Liquid dispersant. Bulletin gives physical properties of Surfynol TG, a liquid nonionic dispersant for emulsion paints. Typical formulations are given for polyvinyl acetate, acrylic, and butadiene-styrene systems. 6 pages. *Air Reduction Chemical Co., Div. of Air Reduction Co., Inc., 150 E. 42nd St., New York 17, N. Y.*

Reference file. A complete reference file discusses the organization, type of service, and manufacturing facilities of a custom injection molder. Included is a diagram of the company's offices, and photographs of its paint shop, finishing shop, die shop, warehouse and shipping department, and press room. 6 pages. *Minnesota Plastics Corp., 45 E. Maryland Ave., St. Paul 3, Minn.*

"Tape it Easy." Booklet presents techniques for protecting underground pipe from corrosion with Scotchrap pipe insulation tape. It provides step-by-step photographs and instructions for wrapping bends, elbows, and short sections; patching pipe with tape; preparing joint surfaces for wrapping; wrapping welded joints; and taping straight pipe

sections as well as street "T" fixtures and other typical fittings. A coverage table lists recommended tape width for various pipe sizes, outlining the minimum recommended tape overlap and the number of squares of tape needed per 100-ft. of pipe using various overlaps. 22 pages. *Minnesota Mining and Mfg. Co., 900 Fauquier Ave., St. Paul 6, Minn.*

"Bulk Storage of Hydrogen Peroxide." Detailed information on new equipment and simplified handling methods for storing bulk quantities of hydrogen peroxide is made available in this new booklet. Drawings show the equipment and typical air and gravity transfer systems. Also included is a partial listing of equipment suppliers. 13 pages. *Advertising and Sales Promotion Dept., Solvay Process Div., Allied Chemical & Dye Corp., 61 Broadway, New York 6, N. Y.*

Price list. Essential oils, aromatic chemicals, etc., are listed. 12 pages. *Fritzsche Brothers, Inc., 76 Ninth Ave., New York 11, N.Y.*

Corrections

In the article "Germany: phenomenal resurgence" (MODERN PLASTICS *34*, 138, Oct. 1956), the following corrections must be noted:

a) Figures in Table I, p. 139, refer to thousands of metric tons.

b) In the list of German plastics manufacturers, p. 140, column 1, "Phenolics: coating resins" should be replaced by "Phenolics: laminates." Farbwerke Wilhelm Urban G.M.B.H., Oberlahnstein am Rhein, should be listed as maker of phenolic resins and molding compounds. In column 4, a group heading is missing after the third company; "Casein Plastics" should appear above August Elhardt Soehne K. G.

c) Caption above picture on p. 142 should read "tear resistance test."

In the article "International standardization of plastics pipes" (MODERN PLASTICS *34*, 296, Oct. 1956), the value of 0.1 appearing in the last line of the center column on p. 296 is incorrect. The correct value is 0.01.

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Reinforced plastics conference

Program of 12th annual session, to be held Feb. 5-7, 1957, at the Edgewater Beach Hotel, Chicago, Ill.

Registration for the 12th Annual Conference of the Reinforced Plastics Div. of The Society of the Plastics Industry, Inc., will begin at 12:00 noon on Monday, Feb. 4, and continue on Tuesday morning. The program of the various sessions will be as follows:

Tuesday, February 5

9:30 A.M. to 12:00 noon—Concurrent sessions on Strength-Time Behavior of Reinforced Plastics, Structural Design, and Preforming.

Session I—Strength-Time Behavior of Reinforced Plastics

Presiding: Frank W. Reinhart, U. S. Department of Commerce, National Bureau of Standards.
Vice Chairman: John McBride, Owens-Corning Fiberglas Corp.
Introductory remarks—*"A Rational Approach to Research, Proof and Specification Testing,"* Frank W. Reinhart, National Bureau of Standards.

"Design and Performance of Reinforced Plastics Pressure Bottles," Arthur J. Wiltshire, Apex Electrical Mfg. Co.

"Status Report of National Association of Corrosion Engineers Technical Unit Committee T-1J on Oil Field Structural Plastics; Performance of Glass-Reinforced Plastics Pipe and Storage Tanks," James E. Carey, Shell Chemical Corp.

"Determination of Long-Time Rupture Stresses in Glass-Reinforced Plastics from Short-Time Static Tests at Different Temperatures," S. Goldfein, U. S. Army Corps of Engineers, Engineering Research and Development Laboratories.

Session II—Structural Design

Presiding: Frederick J. McGarry, Assistant Professor of Materials, M.I.T.
Vice chairman: William G. Cole, Jr., Ferro Corp.

"Boat Hull Construction," Ralph Della Rocca, Gibbs & Cox.

"Reinforced Plastics Reflectors," Ralph L. Mondano, Raytheon Manufacturing Co.

"Rigid Reinforced Plastics Radomes for Ground Environments," Phillip Davis, Massachusetts Institute of Technology, Lincoln Laboratory.

"Reinforced Plastics Exterior Curtain-Walls," Robert R. Keller and James W. Ellet, Keller Products, Inc.

"Engineering Design of the Plastics 'House of Tomorrow'," A. G. H. Dietz, F. J. McGarry, and F. J. Heger, Massachusetts Institute of Technology.

Session III—Preforming

Presiding: George L. Smead, L-O-F Glass Fibers Co.
Vice Chairman: L. Stievator, Jr., McKesson and Robbins, Inc.

"Making the Preform Screen," Thomas Harris, Structural Fibers, Inc.

"Binders for Glass Preforms," G. W. Burton, Westinghouse Electric Corp., Engineering Dept.

"Control of Electricity on Glass in Preforming Operations," William W. Thompson, Owens-Corning Fiberglas Corp.

"The Pressurform Process of Preforming," S. H. A. Young, Pressurform Container Corp.

12:30 to 2:00 P.M.—Luncheon
Welcoming Address: Harry R. Sheppard, Westinghouse Electric.

2:00 to 5:00 P.M.—Concurrent sessions on Strength-Time Behavior of Reinforced Plastics, Cost Estimating and Control, and Plastics for Tooling.

Session I—Strength-Time Behavior of Reinforced Plastics

Presiding: Ralph Sonneborn, Owens-Corning Fiberglas Corp.
Vice Chairman: H. A. Perry, Jr., U. S. Naval Ordnance Laboratory.

"Fatigue Strength of Reinforced Plastics," N. Fried, N. Y. Naval Shipyard Material Laboratory.

"Fatigue Properties of Glass-Fiber-Reinforced Plastic Laminates Subjected to Various Conditions," K. H. Boller, Forest Products Laboratory, U. S. Department of Agriculture.

"Flexural Fatigue Strengths of Reinforced Thermosetting Laminates," Brandon B. Pusey, Bakelite Co., Physics Development Laboratories.

"Some Fatigue Characteristics of Glass-Reinforced Plastics," H. R. Nara, Case Institute of Technology.

"Accelerated Fatigue of Reinforced Plastics," L. S. Lazar, General Electric Co., General Engineering Laboratory.

Session II—Cost Estimating and Control

Presiding: Ned H. Porte, General American Transportation Corp.
Vice Chairman: A. W. Levenhagen, Molded Fiber Glass Tray Co.

"Cost Estimating on Tools and Piece Price," Morgan Martin, Molded Fiber Glass Body Co.

"Cost Accounting and its Value in Quotations," Donald Storey, Molded Fiber Glass Co.

"Cost Estimating and Control," Arthur S. Allison and J. Ken-

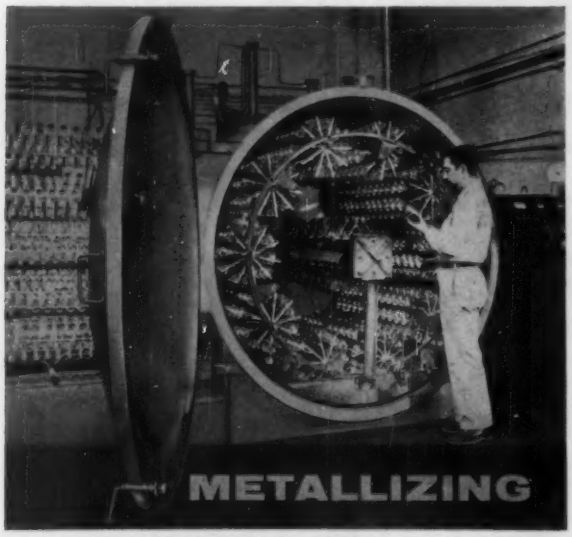
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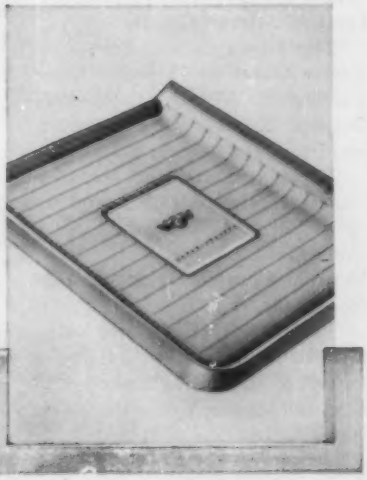
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wood Dawson, Zenith Plastics Co.

"Reinforced Plastics Estimating and Manufacturing Checks and Balances," Frank Sheffler and Charles Nerzig, Lunn Laminates.

"Estimating for Sales," Robert E. Griffith, Structurlite Plastics.

"Cost Estimating and Control in the Reinforced Plastics Field," Kenneth Beer, Resolite Corp.

Session III—Plastics for Tooling

Presiding: Fred Lyijynen, Automotive Body Div., Chrysler Corp.
Vice Chairman: Edward A. Jonasch, Jonasch Plastics Co.

"The Introduction and Progress of Plastics Tooling," Ralph L. Mondano, Raytheon Mfg. Co.

"Challenge of Plastics to Metal Tooling," Donald Pickles, Ford Motor Co., Stamping Process Dept.

"Aggregate Reinforcements for Cast Epoxies," John Delmonte, Furane Plastics, Inc.

"Report on Technical Activity of the S.P.I. Plastics for Tooling Division," John Mickey, Ford Motor Co., Manufacturing Research Dept.

Wednesday, February 6

7:30 A.M.—Speakers' Breakfast
9:00 A.M. to 12:00 noon—Concurrent sessions on Strength-Time Behavior of Reinforced Plastics, Engineering—Design and Processing, International Panel Discussion, and Metal Mold Makers.

Session I—Strength-Time Behavior of Reinforced Plastics

Presiding: Frederick Shaw, Continental Can Co., Conolite Div.
Vice Chairman: E. C. Mooring, Douglas Aircraft Co., Inc.

"The Significance of Transition Temperatures in Polyester Glass Laminates," A. D. Coggeshall, General Electric Co., Materials and Processes Lab.

"Unsteady State Heat Transfer Characteristics at High Temperatures Through Reinforced Plastics," J. L. Dietz and W. J. Hangen, Chrysler Corp., Missile Operations.

"The Resistance of Glass Reinforced Plastics to High Temperature-High Humidity Exposures," F. R. Barnet and Marlin A. Kinna, Naval Ordnance Laboratory.

"Strength-Time Relationship of Silicone Laminates Made from Various Materials," J. R. Bond and E. C. Elliott, Dow Corning.

Session II—Engineering—Design and Processing

Presiding: T. B. Blevins, U. S. Dept. of the Army.
Vice Chairman: John B. Alfers, U. S. Dept. of the Navy.

"Effects of Nuclear Radiation on the Mechanical Strength Properties of Glass Fiber-Reinforced Plastic Laminates," Robert C. Tomashot, Wright Air Development Center.

"Silane Finishes for Fibrous Glass," M. H. Jellinck, Silicones Div. and N. D. Hanson, Bakelite Co., Div. of Union Carbide & Carbon Corp.

"Variation of Physical and Electrical Properties of Silicone-Glass Laminates as a Function of Fabrication Variables," E. C. Elliott and K. R. Hoffman, Dow-Corning Corp.

"Directional Orientation of Reinforcing Filaments and its Influence on Plastic Product Design," Alexander L. Donaldson, Minnesota Mining & Mfg. Co.

"Developments in Reinforced Plastics Honeycomb Core Materials," Kenneth M. Holland and Richard P. Forsberg, Hexcel Products, Inc.

Session III—International Panel Discussion

Presiding: James S. Lunn, Lunn Laminates, Inc.
Vice Chairman: Clare E. Bacon, Owens-Corning Fiberglas Corp.
Interpreter: Miss Eliane Henno, Advtg. & Promotion Mgr., International Div., Owens-Corning Fiberglas Corp.
The following representatives from countries outside of the United States will speak on reinforced plastics developments in their respective areas: **Canada**, Charles W. Ness, Fiberglas Canada, Ltd.; **England**, H. V. Blake, Fibreglass, Ltd., **France**, G. de Piolenc, Saint-Gobain, Inc.; **Germany**, Dr. Max Hagedorn, Consultant; **Holland**, Dr. R. Tunteler, Plastics Research Institute T.N.O.; **Italy**, Andrea de Angelis, Montecatini; **Japan**, Hideo Yamamoto, Asahi Glass Co., Ltd.; **Mexico**, E. R. Stetson, Celanese Mexicana, S.A.; **Norway**, Alex Dobrowen, Consultant; **Sweden**, Rudolf Abelin and Per Aagren, Swedish Plastics Federation; **Switzerland**, Donald M. Joseph, Ciba Co., Inc.

Session IV—Metal Mold Makers

Presiding: W. Burdette Wilkins, Consultant.
Vice Chairman: George Lubin, Bassons Industries Corp.

"Design of Molds," John C. Reib, Shaw Industries, Inc.

"Development of a Unique Mold for a Reinforced Plastics Cash Register Housing," M. J. Petretti, Camfield Fiberglass Plastics, Inc.
Forum Discussion on *"The Value of the S.P.I. Mold Data Sheet."*

12:30 to 2:00 P.M.—Luncheon
Presiding: Hiram McCann, Editor, MODERN PLASTICS Magazine
Addresses: *"Marketing Possibilities for Reinforced Plastics in Trucks,"* Ken Sanders, Sales Manager—Reinforced Plastic Div., Heil Co.; *"Designing with Reinforced Plastics"* (Preview of new slide film produced by Publicity Committee of the Reinforced Plastic Div.) Narrated by W. J. Connelly, Bakelite Co.

2:00 to 5:00 P.M.—Concurrent sessions on Testing, Aircraft Engineering, and Materials.

Session I—Testing

Presiding: Ralph Della Rocca, Gibbs & Cox, Inc.
Vice Chairman: Phillip Williams, Owens-Corning Fiberglas Corp.

"Application of Radioisotopes to Non-Destructive Testing of Fiber Glass Reinforced Plastics," J. L. Kalinsky, New York Naval Shipyard.

"Compression Testing of Cast Resin Samples," W. H. Brueggemann and F. R. Pflederer, A. O. Smith Corp.

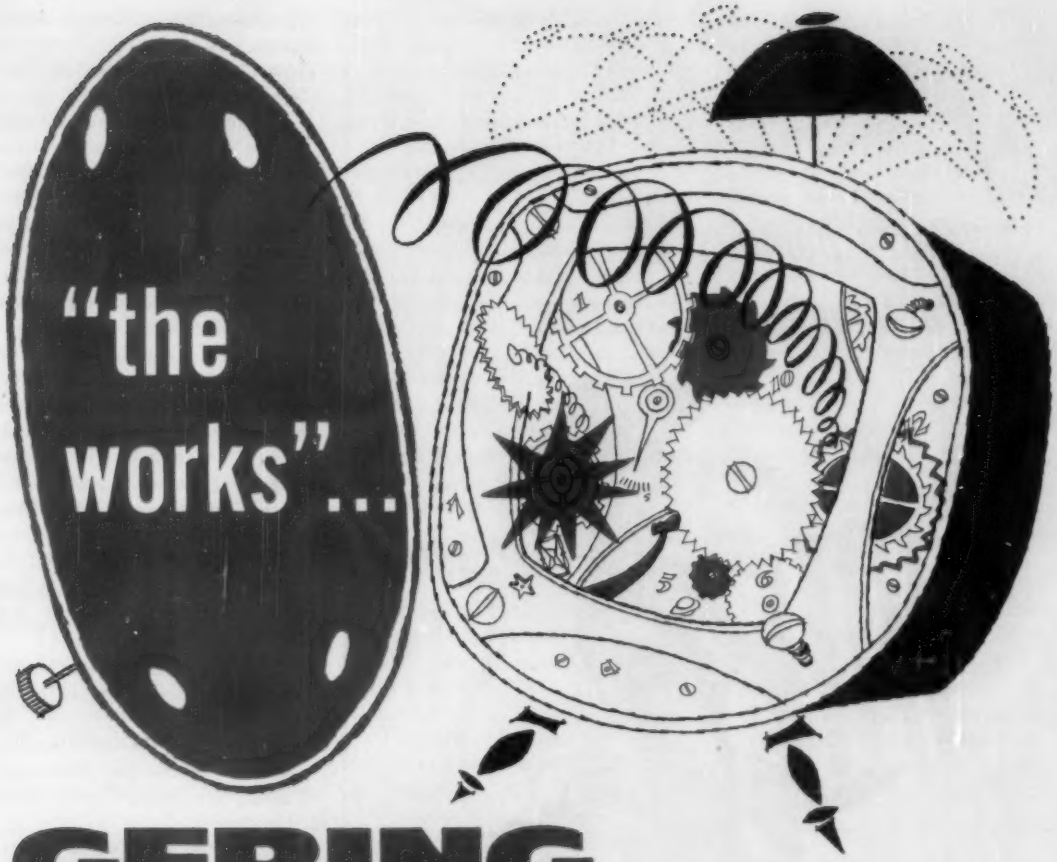
"A Technique for Testing Large Reinforced Plastics Structures," J. K. Burkley, Goodyear Aircraft.

"Quality Control in the Production of Reinforced Plastics Pipe," H. D. Boggs, The Fibercast Corp.

"Resin Degradation Testing," W. G. Murray and G. A. Stein, A. O. Smith Corp.

Session II—Aircraft Engineering

Introductory address and Presiding: General B. S. Kelsey, Rtd.,



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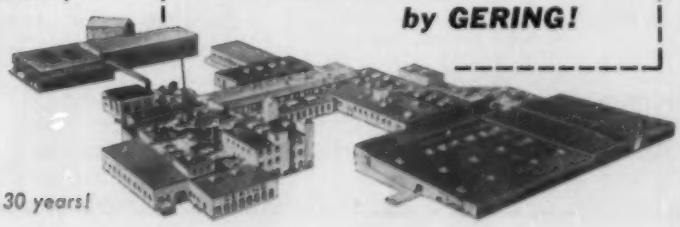
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—*"Introduction to Aircraft Applications."*

Vice Chairman: John W. Rix, Cessna Aircraft Co.

"Developments in Reinforced Plastics for Aircraft Applications," D. H. Cartolano and Herbert S. Schwartz, Wright Air Development Center, Wright-Patterson Air Force Base.

"Plastic Laminate Heat Shields," John G. Stansbury, Swedlow Plastics Co.

"Design and Fabrication of Heat-Resistant Radomes," H. O. Pierson, Goodyear Aircraft Corp.

"Design Data for Reinforced Plastics," Capt. W. E. Dirkes, Wright Air Development Center, Wright-Patterson Air Force Base.

Session III—Materials

Presiding: Frank W. Reinhart, U. S. Dept. of Commerce, National Bureau of Standards.

Vice Chairman: Richard J. Savage, Celanese Corporation of America.

"A Survey of Recent Developments in Resins for Reinforced Plastics," Dr. Irving Skeist, Skeist Laboratories.

"A Survey of New Developments in Reinforcements for Reinforced Plastics," Semond Levitt, Mechtronics Co.

"A Survey of New Developments in Fillers for Reinforced Plastics," George Lubin, Bassons Industries Corp.

"A Survey of New Developments in Core Materials for Reinforced Plastics," I. N. Einhorn, The Englander Co., Inc.

Thursday, February 7

7:30 A.M.—Speakers' Breakfast

9:00 A.M. to 12:00 noon—Concurrent sessions on Glass and Finishes, Premix, and Safety and Industrial Hygiene.

Session I—Glass and Finishes

Presiding: B. Raffel, Goodyear Aircraft Corp.

Vice Chairman: Dominick Rosato, Raybestos-Manhattan, Inc.

"Improvement of Reinforced Plastics by Fibers from New Glasses," James W. Case, U. S. Dept. of the Navy, Bureau of Ordnance, and Messrs. A. L. Houze, J. F. Brossy, and Albert Lasday, Houze Glass Corp.

"The Effect of Glass Finishing

Agents on the Strength of Polyester-Fiberglass Laminates," N. M. Trivisonno and Lieng-Huang Lee, Case Institute of Technology, Dept. of Chemistry and Chemical Engineering.

"Contribution of Glass Fiber Wetting to the Physical and Chemical Properties of Glass Reinforced Polyester Systems," Victor G. Soukup and F. H. Bratton, The Cincinnati Milling Machine Co., Chemistry and Abrasives Research Dept.

"New Developments in Fillers," J. R. Wilcox, Minerals and Chemicals Corporation of America.

"A Water Soluble Universal Finish for Glass Fabric," J. R. Bond, H. A. Clark, and K. R. Hoffman, Dow Corning Corporation.

Session II—Premix

Presiding: Lawrence Wittman, Lawrence Wittman & Co.
Vice Chairman: R. H. Calderwood, Westinghouse Electric Corp.

"Premix Molding Techniques and Tooling," Richard F. Doyne, Thermaflow Chemical Corp.

"Formulating Polyester Premix Molding Compounds," John B. Crenshaw, Interchemical Corp.

"A Study of Various Reinforcing Materials in Polyester Premix Compounds," W. O. Erickson and W. R. Ahrberg, Glendale Plaskon Laboratory, Barrett Division, Allied Chemical & Dye Corp.

"Cooperative Development of Improved Test Method for Premix," (Report of Standards Committee Project) Kenneth B. Sadler, The Glastic Corp.

"The Place of Premix in the Molding Industry; Review of Important Applications," James L. Harvey, Plumb Chemical Corp.

Session III—Safety and Industrial Hygiene

Presiding: Charles H. Rybolt, Lucidol Div., Wallace & Tiernan, Inc.
Vice Chairman: Dan B. Hains, Consultant.

"Industrial Hygiene Practices in Reinforced Plastics," William R. Bradley, Chief Industrial Hygiene Section, Central Medical Dept., American Cyanamid Co.

"Safety in the Reinforced Plastics Industry," Roy C. Berg, Lunn Laminates, Inc.

"Styrene Monomers—Safety in Storage and Handling," Robert F. Helmreich, The Dow Chemical Co.

"Epoxy Hardeners with Low Irritation Potential," B. E. Goddard, T. W. Nale, C. F. Pitt, and Dr. A. K. Ingberman, Bakelite Co.

12:30 to 2:00 P.M.—Luncheon—Personnel Session.
Presiding: Roger B. White, The Glastic Corp.
Addresses: *"Employees are Seeking a Place to Grow,"* William E. Bright, Pure Oil Co.

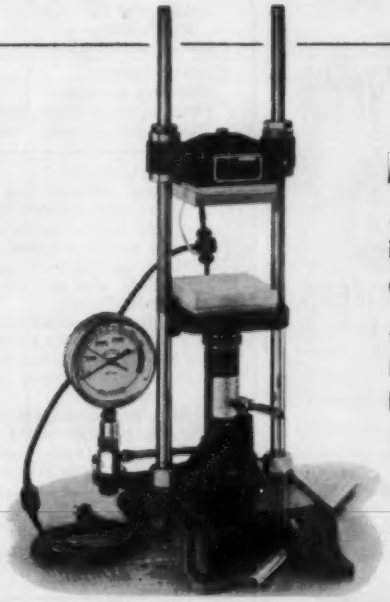
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mp Plastics

Production and sales figures in 1000 lb.* for August and September 1956

Materials	*Total p'd'n first 9 mos. of 1956‡*	*Total sales first 9 mos. of 1956‡*
Cellulose plastics:[a]		
Cellulose acetate and mixed ester		
Sheet, under 0.003 gage	14,775	14,890
Sheets, 0.003 gage and over	12,150	11,924
All other sheets, rods, tubes	5,564	5,415
Molding, extrusion materials	65,611	64,420
Nitrocellulose sheets, rods, tubes	4,197	3,796
Other cellulose plastics	4,064	3,631
Phenolic and other tar-acid resins:		
Molding materials[a]	165,827	145,004
Bonding and adhesive resins for:		
Laminating (except plywood)	47,446	33,132
Coated and bonded abrasives	11,201	11,519
Thermal insulation	41,601	40,920
Plywood	32,619	26,168
All other bonding uses¶	38,498	36,020
Protective-coating resins	21,818	19,390
Resins for all other uses	24,812	21,909
Urea and melamine resins:		
Textile-treating resins	31,194	29,200
Paper-treating resins	18,151	16,843
Bonding and adhesive resins for:		
Plywood	76,602	71,773
All other bonding and adhesive uses, including laminating	18,358	17,194
Protective-coating resins	26,707	19,889
Resins for all other uses, including molding	64,561	61,721
Styrene resins:		
Molding materials[a]	329,161	296,480
Protective-coating resins	69,061	68,480
Resins for all other uses	79,707	74,572
Vinyl resins, total[b]	546,541	523,405
Polyvinyl chloride and copolymer resins (50% or more polyvinyl chloride) for:		
Film (resin content)		56,651
Sheeting (resin content)		41,493
Molding and extrusion (resin content)		147,193
Textile and paper treating and coating (resin content)[c]		45,223
Flooring (resin content)		46,531
Protective coatings (resin content)		20,639
All other uses (resin content)		52,684
All other vinyl resins for:		
Adhesives (resin content)		27,790
All other uses (resin content)		84,839
Coumarone-indene and petroleum polymer resin:	185,219	181,847
Polyester resins:	53,862	47,347
Polyethylene resins:	406,430	370,949
Miscellaneous:		
Molding materials[a,d]	31,587	28,644
Protective-coating resins[e]	7,957	4,055
Resins for all other uses[f]	89,021	80,750

*Dry basis designated unless otherwise specified. †Revised.
‡Partially estimated. ¶Includes friction materials.
[a]Includes fillers, plasticizers, and extenders. [b]Production statistics by uses are not representative, as end use may not be known at the time of manufacture. Therefore, only statistics on total production

Production

From statistics compiled by the U. S. Tariff Commission

August†		*September‡*	
Production	*Sales*	*Production*	*Sales*
1,787	1,601	1,883	1,833
1,514	1,486	1,503	1,450
515	537	559	544
7,395	7,698	8,579	7,888
443	376	324	354
554	459	279	244
16,114	13,730	15,791	13,848
4,783	3,640	5,732	4,359
841	753	1,093	1,050
4,402	4,029	4,084	4,181
3,747	3,143	3,881	2,839
4,301	3,660	4,185	3,997
2,361	1,695	2,176	1,967
3,639	3,142	2,904	2,783
2,654	2,711	2,294	2,648
1,748	1,666	2,200	1,769
8,004	8,086	7,916	7,786
1,715	2,144	1,826	1,843
2,817	2,366	2,951	2,373
7,051	7,352	7,581	7,179
34,519	31,073	37,284	30,704
6,401	7,154	6,737	7,200
9,769	9,701	12,030	7,499
57,121‡	63,412	60,237	59,821
	6,497		7,159
	4,787		4,194
	17,490		17,228
	5,727		5,198
	6,798		5,526
	2,416		2,025
	7,228		5,945
	3,256		2,893
	9,213		9,291
22,755	22,467	20,513	20,538
6,634	5,355	5,369	4,602
49,790	46,400‡	51,089	40,056
3,259	3,381	3,468	3,796
1,033	481	1,055	568
9,881	9,383	9,830	8,489

are given. *Includes data for spreader and calendering-type resins. ‡Includes data for acrylic, nylon, and other molding materials. *Includes data for epichlorohydrin, acrylic, silicone, and other protective-coating resins. ‡Includes data for acrylic, rosin modifications, nylon, silicone, and other plastics and resins for miscellaneous uses.

IDEAS...

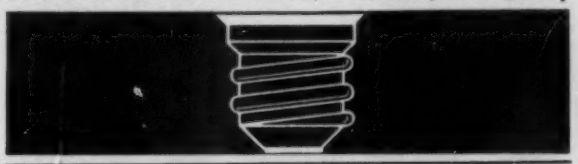
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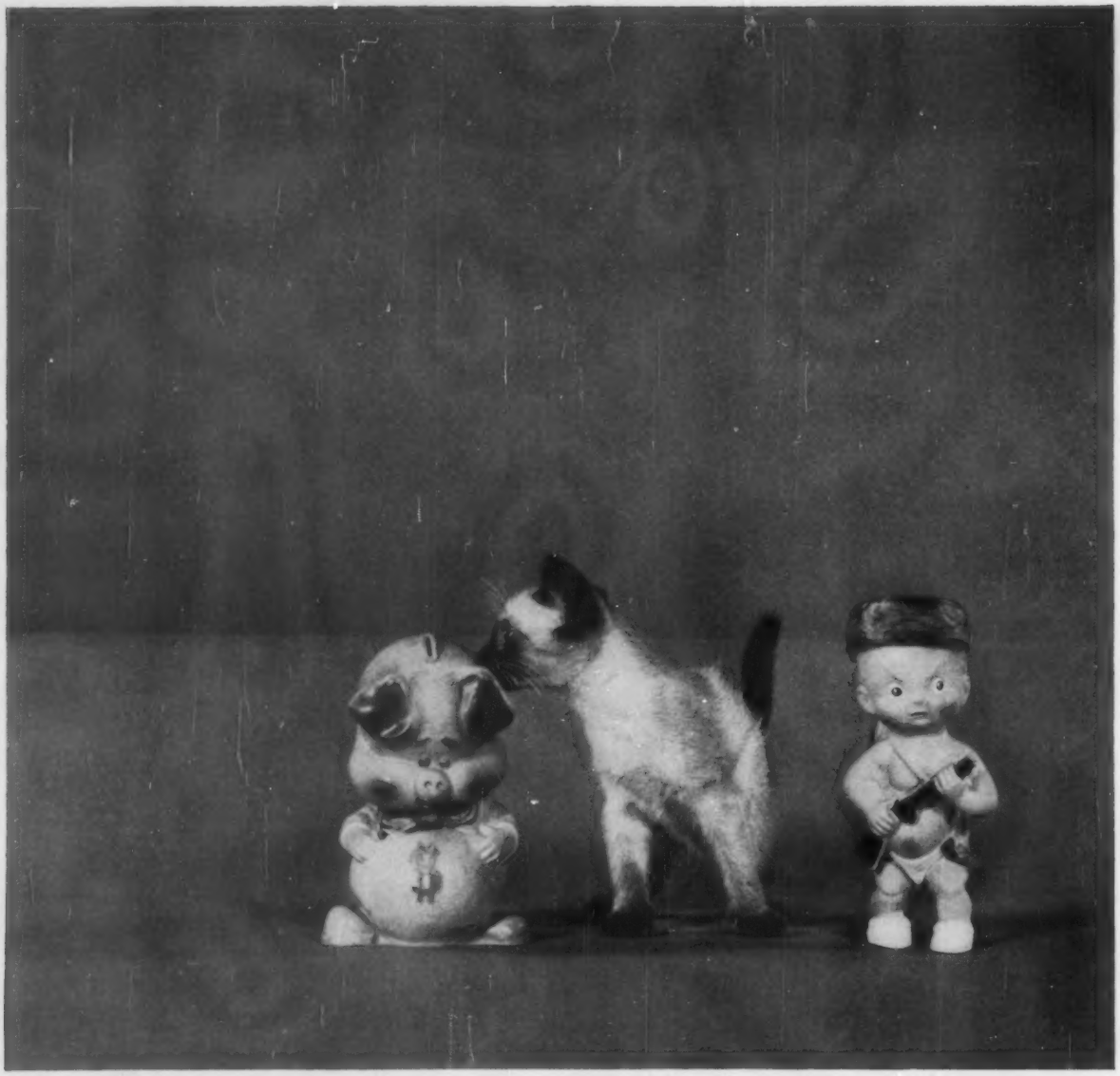
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Phenolics

(*From pp. 87-92*)

wood flour-filled is the mineral and cotton flock type. The former is for electrical applications and the latter for impact resins such as those used for washing machine agitators.

No great gain has been created in phenolics by use of new fillers in recent years, but the researchers have still managed to improve certain properties that have been of benefit to the molder. Faster molding materials have been developed by all producers so a molder can now get more pieces per hour from automatic presses.

Still another improvement in resins has been in arc-resistant materials. Producers are hopeful of even more improvement.

Color coating—Another significant aid to phenolic moldings has been the discovery of an epoxy coating in color which is highly scratch- or mar-resistant. It can be brushed, dipped, or sprayed. Molders see it as a possible means to the future use of colored phenolic appliance handles—perhaps to even regain a part of the radio cabinet and telephone business or anywhere else that lack of color has hurt the market.

Laminating resins—Total consumption of laminating resin is based on the Tariff Commission's production rather than sales figure because many companies make their own resin, but even then the reported volume is generally considered less than that actually used. Estimators believe that the industry has grown more than the figures indicate.

The government's official report showed a production of 32.9 million lb. in the first half of 1956 compared to 34 million lb. in 1955, but the second half of 1956 will show a big gain to make a total of between 75 and 80 million lb. for the year—a few million pounds under 1956.

Industrial uses have been growing gradually over the last three years after a severe slump in the late 1940's. A great portion is for the automotive and its supporting industries, and there are a few hundred thousand pounds in helmet liners; but the forward movement has been largely in printed circuits. Industry's increasing need for miniaturized electronic equipment has put printed circuits in a choice position. Most of the circuits are on phenolic laminates and resin producers are convinced they will hold this ever-increasing market. Some epoxy resins are used, but they are three times more expensive and their electrical properties are not better enough to pay that cost, except in specialized uses.

The division between industrial and decorative laminates in 1956 is estimated in the range of 50 million lb. of resin for the former and 25 million for the latter. The decoratives are thought to be down a little under last year for their first decline in recent years, even though several plants added increased capacity. The summer decline was a little worse than usual and resulted from the drop in furniture and home construction. However, an encouraging sign for the future was increased growth in the use of horizontal decorative panels.

About $41 million worth of decoratives were sold in the first nine months of 1956. Square footage for the year is expected to be between 150 and 175 million. A square foot of decorative weighs 0.470 lb. according to a rule of thumb estimate. It consists of 0.265 lb. kraft core stock, 0.135 lb. phenolic resin, 0.042 lb. melamine, and 0.028 lb. overlay print. Thus 150 million sq. ft. of decorative laminate would consume 20.2 million lb. of phenolic and 6.3 million lb. of melamine resin if there was no waste.

Declines in abrasive and friction materials reflected the drop in steel due to the strike and lower production of automobiles. Abrasives have ridden the steel curve for years: the loss in friction materials for clutch facings may be permanent because of the automotive trend toward automatic transmissions.

Volume figures for resin used in the plywood industry is another of the phenolic totals that is affected by captive production and by the entry of many new companies which produce their own resin, some of which may not yet report their consumption figures. Furthermore, some resin used for





hardboard may be in this classification, although it is supposed to be in bonding resins. In any case, if the 36 million-lb. figure for plywood resins is correct, it is an indication that the use of phenolic resin in softwood plywood is increasing since all softwood plywood production was off about 5% in 1956. According to our western informant, this happy result stems from the steadily gaining amount used in interior grade plywood. All exterior grade has been phenolic for many years.

The situation for more use of resin in this classification is such that an estimate of 50 million lb. by 1960 is quite certain to come true. The plywood industry was plagued by the usual price problems in 1956. Price dropped "officially" from $90 to $67 at the mills. According to our western informant, most mills are technically obsolete and will be revamped—maybe the resins will, also. But new mills are being built even though the industry operated at only 75% of capacity in 1956. They will upgrade the entire industry and use more phenolic than ever before.

Thermal insulation was down in 1956 because of a serious drop in the summer months. The home building decline was held responsible, but a new market in car insulation looks promising.

All other bonding resins uses include such activities as shell molding, timber laminating, waste wood, and paper-impregnated battery separators, although some of the latter may have been reported in other classifications.

Shell molding, the most promising of all in this classification, still consumes only about 10 million lb./yr., but it's coming along. Growth is slow because it's a costly venture to change over from the old method. Ford and General Motors are increasing their shell molding operations, but International Harvester is still on an experimental basis. Chrysler may have to change over to meet competition. Several foundries have changed over and others will have to follow. It's still possible that the 50- or 60 million-lb. volume mark will be reached in four or five years. The resin used—27¢/lb.—is the second lowest

price phenolic sold on a solid resin basis.

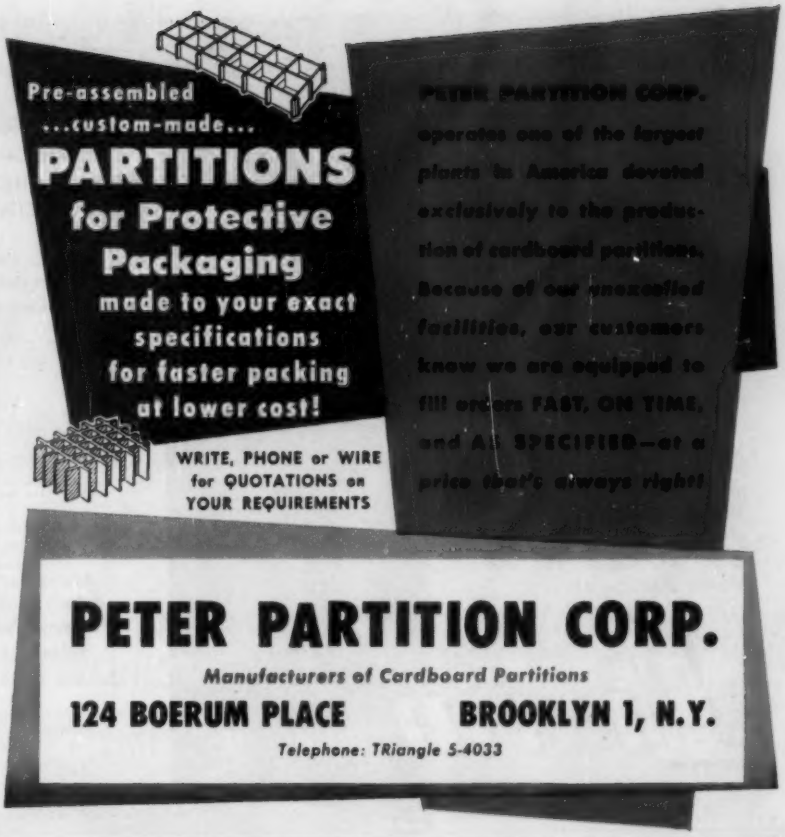
Phenolic paper-impregnated separators for batteries are booming and should become even larger. One estimator thinks that more than 15 million lb. went to this use in 1956.

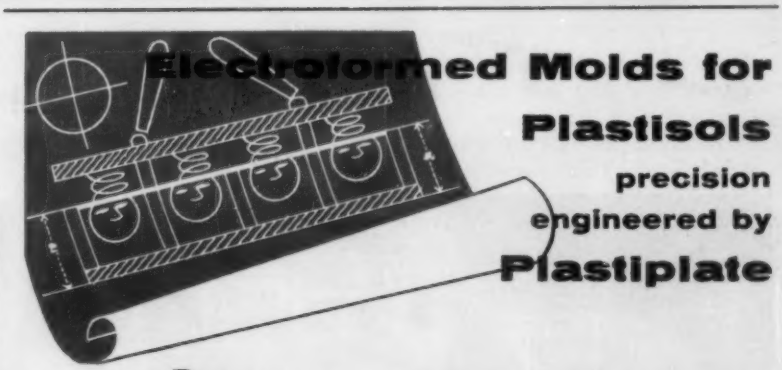
Resins for hardboard, particle board, and various panel boards are still small in volume but the application is such a natural for wood conservation that they are certain to grow. Timber laminating and edge glueing where resorcinols are prominent have suddenly picked up in good volume; this time the impetus is civilian rather than military and growth should be continuous.

Resin for protective coatings shows a slight increase, but the volume has been about the same level for a number of years. Phenolic coatings are used primarily for maintenance and as primers on cans before a vinyl coating is applied. Resin prices for these formulations range from 28½ to 54¢/lb., with the most standard grade at 39 cents.

Miscellaneous use is difficult to analyze. There are scores of items, including microballoons which prevent evaporation of petroleum products in tanks; perhaps 3 million lb. for Pregwood; oil well drilling mud additives, ink; foam; and others. The largest item in this category may well be the resin used in rubber reinforcement. There is only one producer and he never talks on the subject. This use is not to be confused with phenolic-rubber resins used for compression molding.

The future for all phenolic resins has been plotted by phenol producers who are counting on steady but not spectacular growth. They say that a rough rule of thumb estimate indicates that one pound of phenol equals a little over a pound of resin production as published in Tariff Commission reports, but only 70% of phenol is used for plastics resins. Thus the 1955 total was 517 million lb. of phenol and 563 million lb. of phenolic materials. They reason that about 680 million lb. of phenol will be produced in 1960, and therefore, about 720 million lb. of phenolic resin will be produced that year.—END





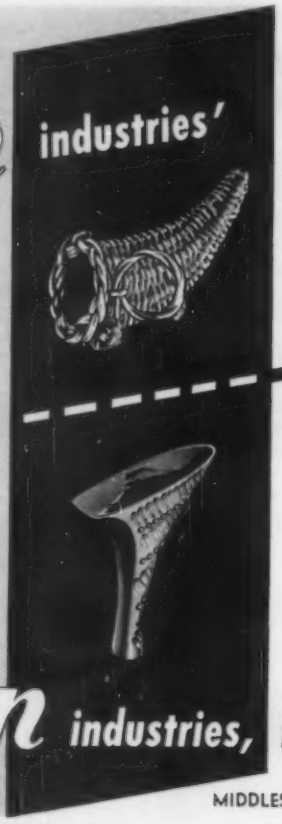
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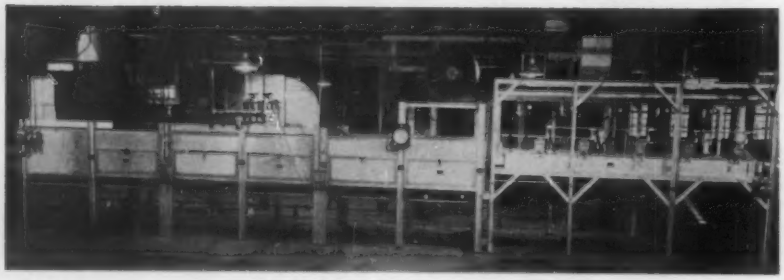
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Urea and melamine

(*From pp. 92-93*)

resins. The waste wood business is still growing, but at a 2 or 3% urea content it will be a long time before volume of resin used is large. The figures in Table IV show a big decline for these bonding resins, but the reason undoubtedly goes back to 1953 when the 43 million-lb. figure probably contained a large amount of resin for plywood use. That was the first year the figures were separated and errors in reporting may have accounted for the difference.

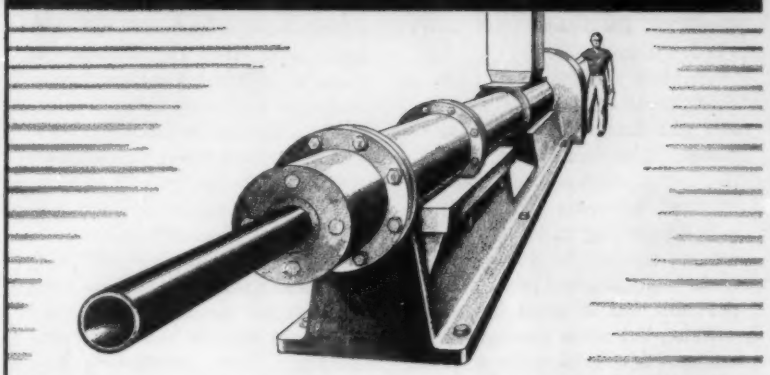
The comparatively new UF Concentrate-85, which is a combination of 59% formaldehyde and 26% urea in a water solution, has made good progress in the last two years. It enables resin makers to produce larger quantities per batch since more water has been squeezed out.

Urea and melamine molding material is expected to show an 8 to 10% increase over 1955. Most of it was in melamine for dinnerware which was probably up 15% over 1955—somewhere around 30 million lb. for 1956. This dinnerware volume has developed in five years: in 1951 the only sizable amount in use was for the Armed Forces. At its present rate of growth, dinnerware consumption of melamine may soon overtake the total amount of urea used for all molding applications. There is no reason why it shouldn't continue to grow.

Better, more translucent resins for dinnerware are increasing the appeal of melamine. The pieces for home use are developing a more housewifely design and it is expected that improvements in the foil decorating technique and a less stainless material will make it even more desirable. The market is by no means saturated —not even in institutions and restaurants where melamine tableware received its initial civilian baptism. A 60- to 80 million-lb. market is dreamed of in the not too distant future.

Other uses for melamine molding resins are up only a few percent over 1955. Aerosol containers for cosmetics are in limited use. Melamine hardware is still in the

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development stage. Buttons, especially for military uniforms, offer a hard surface that is impervious to damage by cleaning chemicals and that withstands rough handling. Mineral-filled melamine for electrical purposes is a specialty resin that is used only on jobs where the user is seeking unusual properties. Glass-filled resin, which was highly publicized and promoted two years ago, is limited in use by cost—90¢ to $1 a lb. compared to the 45¢ price of the alpha-filled type used for dinnerware. It is doubtful that all the melamine molding compound used, exclusive of dinnerware, is more than 12 million lb. a year.

Exports of melamine and urea are included in the miscellaneous category. They were exceptionally good in 1956 and may have reached 18 or 19 million lb. compared to 16 or 17 in the two previous years. The export figure does *not* include melamine shipments to Puerto Rico which has a large dinnerware molding industry.

Urea molding powder is holding its own at close to the same level established several years ago. Buttons and wiring devices are still the leading outlet, but closures, the third largest, has slumped a bit because of the invasion of colored polyethylene caps. Color has long been urea's big selling point whenever colored caps were desirable, but polyethylene has both color and a certain amount of flexibility to offer and it can be molded faster.

The low-cost, wood flour-filled urea in black and brown brought out several years ago has not yet made much of a dent in the market. It sells for 18.75¢ but has a higher specific gravity than 21¢ phenolic resins with which it competes. Failure to take high frequency heat and its low torque strength limit its applications.

Miscellaneous uses hold about even from year to year. Toilet seats of urea are on the market, but no new producers have come into production to broaden the field. Cosmetic containers are still an important item in the industry. Control knobs on stoves is one of the better markets for urea. Radio cabinets, light fixtures, clock housings, and large size decorative containers are all good and continuing markets for this material with a color appeal that is hard to beat.

Emphasis on larger molded pieces of both urea and melamine continues to interest the industry. Washing machine agitators and kitchen sink drain boards in melamine are examples. Strip lighting fixtures that don't burn easily are an old item, but improved resins may improve their desirability.

Europeans have perhaps gone farther with urea applications than Americans, even though the European product may not always equal some of the higher properties of American urea, according to American producers. But foreign molders work under a different economy. They don't seem to mind much slower cycles than Americans will tolerate and, consequently, can produce a better item from a less efficient molding material because they spend more production time.—END

Cellulosics

(From pp. 93-96)

stores will wrap their own foods and seal the wrapper with simple plates or hand irons. The big sales gimmick is that the film will breathe without perforation and prevent fogging while under refrigeration. The film has been well tested in 1956 by chain store distributors of packaging materials and is expected by all concerned to live fully to its advance billing.

Table V, p. 94, shows progress in the older cellulosic films. Most of the under 0.003 gage is cast film used primarily for recording and electrical tape. It is also used for gold stamping foil and is growing rapidly in use for window envelopes. It now has only 10% of the latter market but is expected to supplant glassine for a much larger portion of the field. It is also used as a separating sheet for fibrous glass panels in laminating, for window boxes, for printed wrappers, and in laminations.

Most of the over 0.003 gage is also cast film, at least until S-652 starts moving, and is used in the graphic arts as well as in protective covers for cards, containers, metallizing, window boxes, electrical insulation, and store window shades.

Vacuum forming has been a chief factor in the growth of film and sheeting in various thicknesses. Blister and skin packaging, signs, and visibility containers are continuing to grow at an ever-increasing ratio. Researchers can acccunt for 3 to 4 million lb. in packaging and point out that per unit use is small by pound volume, but some vacuum formers say that total volume of all vacuum formed cellulosics may account for as much as 8 or 9 million pounds. They point to the increasing volume of outdoor butyrate signs, point-of-sale displays in acetate, and many miscellaneous captive uses where the manufacturer of a product does his own packaging.

Plastics industry cynics scoffed at the 103 million-lb. total for acetate and butyrate in 1946 to which heights it had jumped from 73 million in 1945 and said it would never grow over that figure because of the advent of lower cost materials. It did decline for a few years after that but got back over the 100 million-lb. mark in 1950 and has now shown almost continuous growth ever since, with 1956 breaking the record. Since 1939, the combined acetates have grown from 21 million to almost 135 million lb., nearly a six-fold increase. Not bad for an industry that has been afflicted with the economic troubles that have faced the cellulosics—not bad for a 15-year stretch in any industry. Since polystyrene became commercially available in large quantity in 1946 with 67 million lb. (about the same stage in its career as acetate in 1939), it too has grown only six-fold. Vinyl chloride, the biggest-volume material of all plastics, has grown from 122 million lb. in 1945 to over 550 in 1956 or about 4½ times since its arrival as a commercially available material in large volume.—END



PLASTICOR

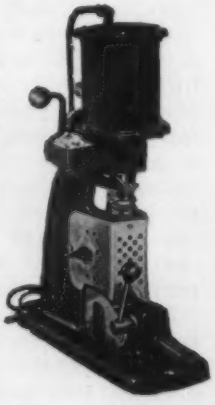
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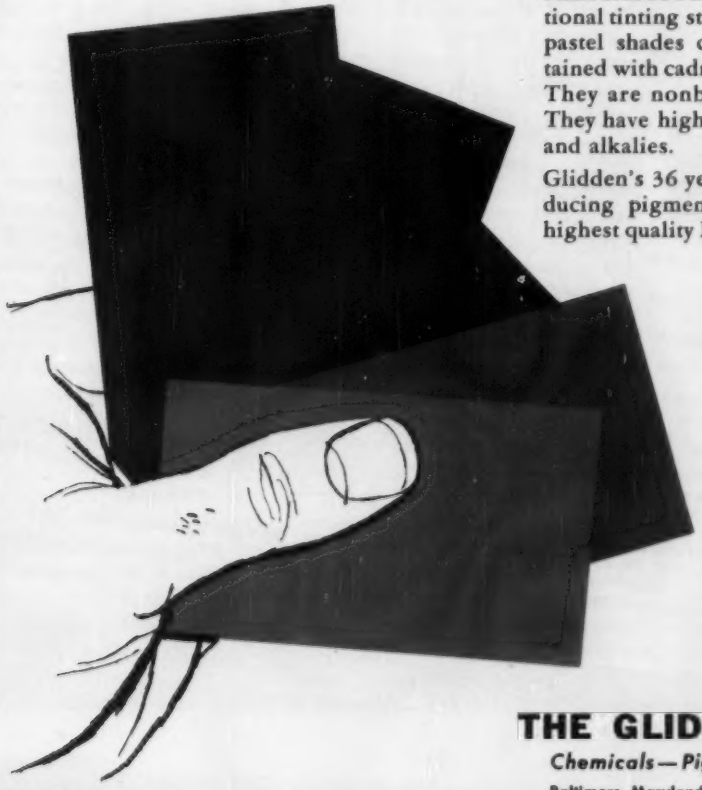
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U.S.I. POLYETHYLENE PROCESSING TIPS

Vol. II, No. 1

WITH MORE TYPES THAN EVER, HERE'S HELP IN CHOOSING THE RIGHT POLYETHYLENE FOR YOU

In the last year polyethylene has become a whole family of resins with a wide range of properties and many new use possibilities.

Today manufacturers are learning how to tailor polyethylene to almost any end use and processing condition by varying three basic characteristics of the resin in the original manufacturing process:

(1) *Density*
(2) *Molecular Weight*
(3) *Molecular Weight Distribution*

The properties of polyethylene, whether made by a high pressure, modified high pressure, or any of the low pressure processes are fixed by *all three* of these characteristics. An extremely large number of resins having markedly different properties can be produced by controlling these fundamental characteristics.

The processor can usually describe the properties he needs and the manufacturer can then determine which resin is most likely to fill the bill. From that point the two can work together to determine the "ideal" resin for the application.

The following chart shows in very general terms how some of the polymer properties are affected as these characteristics are varied.

Figure I: How Properties Change With Molecular Characteristics

PROPERTY OF POLYETHYLENE	CHARACTERISTIC		
	Increasing Density	Increasing Mol. Wt.	Widening M.W.Dist.
Stiffness	increases	increases slightly	increases slightly
Tensile Yield Point	increases	little or no effect	little or no effect
Film Brittleness	increases	decreases	increases
Softening Point	increases	increases	decreases
Low Temperature Brittleness	decreases	decreases	increases
Resistance to Environmental Stress Cracking	decreases	increases	decreases
Permeability	decreases	little or no effect	little or no effect
Tear Strength (Elmendorf)	decreases	increases	increases
Impact Strength	decreases	increases	—

Effects of Density Variations

The term density describes the weight per unit volume of the resin, and is influenced by the amount of branching in the molecule. Densities can range from 0.910 to 0.965.

The effect of density variations on polyethylene properties will be discussed completely in the next issue of "Polyethylene Processing Tips". You may receive your copy by mail simply by requesting it.

Effects of Molecular Weight

The term molecular weight when applied to polyethylene describes the average or mean size of the molecules in the resin.

Melt index has been used to indicate molecular weight in the past, but since it is also affected by the degree of branching of the molecules, it is a close, but not a completely reliable guide. In these discussions, therefore, we will refer to molecular weight rather than to melt index.

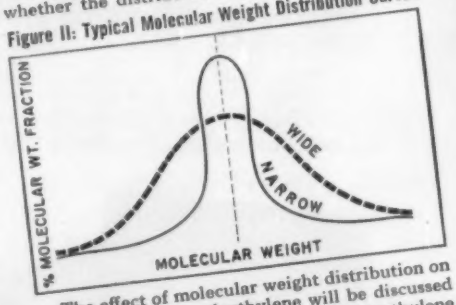
The effect of molecular weight variations on polyethylene properties will be discussed completely in a future issue of "Polyethylene Processing Tips".

Effects of M.W. Distribution

Distribution is determined by measuring how many of each size of molecule is present. When the percentage of each size of molecule is plotted against molecular weight, a distribution curve similar to the one shown below is obtained.

The shape of the curve for each resin tells whether the distribution is wide or narrow.

Figure II: Typical Molecular Weight Distribution Curves



The effect of molecular weight distribution on the properties of polyethylene will be discussed completely in a future issue of "Polyethylene Processing Tips".

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Acrylics

(*From pp. 96-97*)

as 50 million lb. of virgin methacrylate sheet and molding material was sold in 1956, but a considerable amount of monomer went into oil additives, lacquer or paint, and other miscellaneous uses. But the Hercules announcement concerning its new plant stated that consumption had doubled since 1949 and is expected to double again in the next five or six years.

Reprocessing—There is another facet of the industry that is too frequently overlooked, but that has been growing steadily. It is essentially a reprocessing operation but quite different from the reprocessing methods used for other thermoplastics. There are several companies engaged in this operation of "cracking" methacrylate sheet scrap and then recasting to bring forth another sheet. In some cases the reprocessed material has been upgraded by adding virgin monomer.

Although lacking the same optical perfection of virgin cast sheet, the reprocessed material can be used in various applications where perfection of clarity is not too essential. It is highly suitable for pearlized buttons, jewelry, and other such items and is widely used for fabricating picture frames, handbags, decorative boxes, and all sorts of high-grade gift and novelty items. Volume poundage of this material is *not* included in any government figures and guesses vary so widely as to make them unprintable, but there are certainly millions of pounds of this material sold every year.

Price going down — Methyl methacrylate is generally considered one of the highest grade thermoplastics on the market. Its beauty, outdoor weatherability, and light transmission properties are difficult to match. Molding volume might well exceed that of other thermoplastics, except that it has always been higher in cost. That price situation has been passing through a rather rapid downward curve in recent years, but there is considerable doubt that it will ever be competitive with polystyrene, polyethylene, and other large-volume thermoplastics. On the other hand, it is steadily moving into price competition with the whole host of plastics in the over 45¢ a lb. range.

A few years ago the price of methacrylate molding material was 70¢ a pound. In 1954 it was 68 cents. But in the past two years, the molding and pelletized extrusion grade has been reduced to 55¢ (delivered) in clear and 59¢ in colored. The unpelletized grade for extrusion is 51 cents. Monomer is now down to 29 cents.

New molding material—Molders should also benefit by a new methacrylate formulation which exhibits greater stability in the mold. The temperature of the injection cylinder can be maintained up to 40° F. higher than formerly and thus give a wider working temperature range with less worry about overheating. The new material flows better and faster and permits filling more cavities with a given ram pres-

sure. Molding cycle reductions of 15 to 20% have been reported, weld lines are less prominent, surfaces are better, and more complex parts can be molded with the new material.

The unpelletized extrusion material, which was introduced in 1955 and sells for 51¢ a lb., is making slow progress but is still considered a good prospect for the future.

Methacrylate molding operations were seriously down in the first part of 1956 because of the automotive decline. In 1955 this use of methacrylate may have totaled more than half of all molding output, with 8 million cars using 1½ lb. or so of material per unit. The loss of 2 million cars in 1956 was then a serious handicap, but the molding part of the industry revived strongly in the last half of 1956 when the new auto models started in production.

Methacrylate sheeting production in 1956 is estimated at figures all the way from 25 to 40 or 45 million lb., but the latter probably includes many million lb. of cast sheet produced from reprocessed material. The amount of extruded sheeting from either the 51 or 55¢ material is disappointingly small for various reasons, both economic and technical, but as mentioned before, the technical problems at least are expected to be overcome.

Outlets for sheeting haven't changed much in recent years. Outdoor signs are probably the largest, with particular growth in the southwest. Diffusers for city street lights, where methacrylate's weathering properties are advantageous, is another growing market. There has also been some introduction of cast material into the household field for towel racks and soap dishes.

The casting field should also soon show the effect of the increased activities of several companies which have been expediting their cast sheet business and also the establishment of a better distribution system.

Plans for future expansion are also based on two comparatively new developments. One is the coating for automobiles which, it is claimed, will make their surfaces more resistant to sunlight. It is now prophesied in some quarters that the new coating, at an added cost of $50 per car, will prevent color fading, cut down the need for polishing, and make open-air garages more practical. It is probable that Hercules, which produces nitrocellulose for lacquer on automobiles, must have looked favorably upon this material as one reason for entering the methacrylate field.

The other possibility for the future is the development of a method by Du Pont for use of methacrylate monomer as a material for fibrous glass-reinforced plastic. It is also possible that it may be used with synthetic fabrics, such as Dacron, Dynel, Orlon, and others to produce reinforced plastics of a more flexible nature for particular use in post forming. A great amount of information on this subject is expected to be released before the end of 1957.—END



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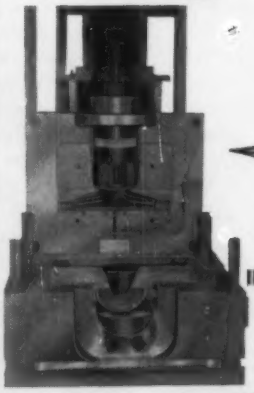
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Polystyrene

(*From pp. 97-99*)

several others. There has been a well publicized surge toward faster molding materials for a year or more, but that property was acquired at the sacrifice of others, so the end result has not always been happy.

Intense research is going on in many laboratories to provide better light stabilization so that polystyrene will be an even better product for light fixtures, venetian blinds, and other items subject to intense light. Presently used materials yellow far less than earlier formulations, but much of it is still general-purpose polystyrene with pigmentation. A more fundamental change is needed and should be forthcoming soon.

The higher-impact section of the business is growing, but previous estimates of its size have probaby been on the high side. Estimates for 1956 vary according to companies interviewed and what formulations are included. The so-called impact and super-impact modified polystyrenes are estimated all the way from 150 to 180 million lb. for 1956, or somewhere in the area of 40 to 45% of all polystyrene. The sheet portion of impact material is guessed in a range of from 35 to 45 million lb. compared to a 25 to 35 million-lb. volume in 1955, but there are no authentic statistics on this subject. There are scores of guesses and various market research studies with figures that come within the brackets named above. Until the producers are willing to turn over their production figures to a confidential central clearing source, the amount of impact material produced is going to remain highly uncertain.

Growth of impact material is apparently not as fast as was expected. It is growing in refrigerators even though troubles have been encountered, but the inner door liner has more than accounted for any decline in other parts. Other impact sheet uses on the way up are signs used in point-of-purchase advertising which may be 4 million lb. or more, lighting and transparencies, housings, and miscellaneous automotive. But the amount of impact styrene used for molding is indeed elusive. It is supposed to represent 50 to 60% of the molding material used in refrigeration or somewhere around 30 million pounds. The percentage of impact material used in toys and housewares is growing but is nowhere near 50% of the whole. Furthermore, toy poundage is not growing and housewares poundage declined in 1956. All this means that greater use must be found for impact material in industrial applications such as housings and it is toward this field that research on tailor-made materials is directed.

One of the most talked about possible improvements in this impact field is the possible development of a transparent high-impact formula. It may even be announced in 1957. If cost is low enough, it could boost styrene sales by millions of pounds.

The market for super-impact is small, but here the story is different. It is new, more difficult to mold, and costs 11¢ more than general-purpose. It is really an engineering material and it takes time to find where it belongs. It has found a place in the better grade portable radio cabinets, lawn mower wheels, pipe fittings, tote baskets, carrying cases, and in other applications that require unusual properties.

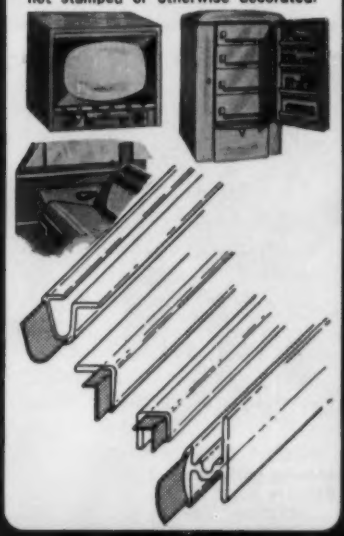
The styrene copolymers with acrylonitrile and butadiene for molding and extrusion purposes are not large in volume. Some 8 or 10 million lb. of copolymer sheet materials was estimated in automotive use in 1955, but there wasn't much gain, if any, in 1956. Extruded pipe is said to have increased over its claimed 3 million-lb. volume in 1955 but, as in most pipe jobs, has to wait for time trials to prove its worth. Copolymers for molding uses are growing just as well as or better than other resins in the 40¢ price range, which is a tough bracket. Most publicized application in this field in 1956 were the billions of C-11 pin curlers and bobby pins by Toni. Solvent resistance was a big factor in choosing C-11. Other uses for these molding materials are in tumblers—which are becoming standard in public insti-

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tutions and restaurants because of break resistance—filter bowls, and storage battery cases which could become the largest application of all.

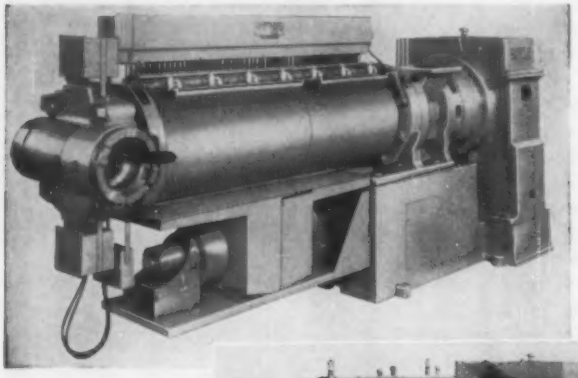
This C-11 styrene-acrylonitrile material and its modifications are expected to show great growth in the next five years. First reason is that it is likely to be sharply reduced in price. Competition is getting stiff in the field and cost of acrylonitrile has been steadily declining. The fields of piping, automotive sheet and moldings, appliance parts, pens and pencils, packaging, and housewares are full of potential uses for this material. It has better chemical resistance, higher tensile strength, and greater heat resistance than standard polystyrene and its other modifications. And furthermore, if unmodified, it is clear. Some day it may come in sheet form.

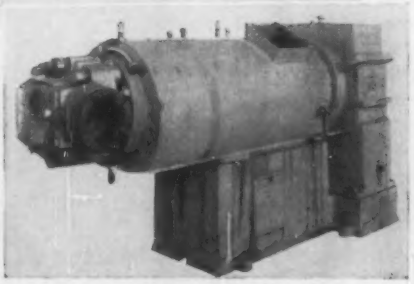
A new material now about ready for marketing by American Cyanamid is produced by polymerizing methyl styrene made from toluene. It is reported that it will compete price-wise and otherwise with standard polystyrene. Toluene is less costly than benzene from which straight styrene is made and supposedly more plentiful in a normal economy. The new material will reportedly be boilable for an extended time and still retain the other properties of styrene plastic. However, Cyanamid is the pioneer and largest producer of acrylonitrile in the United States. It is logical to expect that it will emphasize its copolymer of methyl styrene and acrylonitrile and thus a powerful new producer will be at work studying new markets.

Packaging applications for styrene-type resins are being groomed as candidates for largest volume in years to come. Thin-walled disposable cups are an example. They aren't classified as packages, but they give the packaging idea of "disposable." Small meat trays, containers for ice cream, delicatessen foods, and other such applications could use as much polystyrene as is made today if they were all molded or vacuum formed. All the meat trays alone used in retail outlets today could account for 150 million lb., according to one estimate. But here the researchers must enter again. Meat may turn dark if it rests in the tray too long without access to air. Latice-work trays don't seem to be the answer.

Various resin formulations are used in these packaging trays and containers. It seems unlikely that any other resin is so well fitted for this field. Polystyrene is crisp, colorful, rigid, and likely to remain lower in cost than other resins for some years to come. General-purpose material is used in most disposable packaging applications, but when a bit more impact is needed a blend of G-P and high-impact is favored.

The price situation has been reserved for the climax of this polystyrene story. A year or so ago it seemed that polystyrene must eventually lose a part of its market to polyethylene which is expected to gradually decline in cost per pound. Some types of polyethylene are already in the close to 35¢ category which ap-





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proaches polystyrene when the weight factor is considered. Extreme competition may force the polyethylene price even lower. On the other hand, it seemed likely for a while that polystyrene would go up. As late as last April it was raised 1½¢ a lb. from its previous 29¢ a lb. price. Then other events intervened and polystyrene is now definitely ticketed for lower prices.

On September 1, the price was reduced to 27½¢ in 20,000-lb. lots for crystal, with a slight premium for colored. Impact in natural is 32¢ and colors are 34½ cents. Super-impact didn't change—it is 38½ and 42½ cents. Acrylonitrile copolymer is 40½¢—down 4½¢ from a year ago.

The price change no doubt occurred because the chemical company producers of styrene monomer are trying to keep the styrene business in their own plants and have persuaded the rubber companies that they can buy monomer from chemical companies at less cost than they can build new plants and make it themselves. The synthetic rubber business is due for a huge expansion and will want many tons of styrene. Consequently, some of the chemical companies have apparently agreed to supply monomer at a reported but unconfirmed price of 12 cents. The present price is 16¢ for rubber-grade styrene.

Styrene for plastics has always commanded a premium price of a few cents a pound over rubber-grade. The reason is that the extra refinement needed for plastics slows down production. Once more the plastics industry finds itself involved with the rubber industry just as it was during the Korea episode. But this time the result would seem to be more beneficial to plastics.

It is this potential low cost, plus new applications in packaging and industrial uses as well as increased use of impact and copolymer materials, that makes styrene-type resin such a good bet for future consideration.

There is left only brief space for mention of the other classifications in the chart and table on page 98. The styrene-butadiene latex coatings maintained their position as a paint and paper coating material. However, it didn't grow much, but that could be because many small paint companies came into the business in 1955 and filled their pipe lines thus creating an inventory situation which leveled off in 1956. The off-machine paper coating field has also just about reached its potential of about 25 million lb. a year of latex.

"Resins for other uses" includes rubber reinforcing (which is probably less than 30 million lb.), ion exchange resins, polystyrene used in flooring compounds, and a few other miscellanies. But the growth in 1956 was in a large measure probably due to foamed polystyrene which is becoming widely used as perimeter and wall insulation in masonry housing. Foamed polystyrene beads are also beginning to make their mark as insulation material, but that type of polystyrene is reported in the molding material classification.—END

Vinyl chloride

(From pp. 99-103)

however, chemically blown foam will always require a fairly expensive chemical blowing agent and must overcome that problem by faster production or superior quality.

Future of foam—But whether it may be vinyl, urethane, or rubber, the future foam market presents amazing possibilities. Automobiles in 1960 will probably have not only foam dashboards and sun visors, but cushioning, door panels, backs of seats, and thermal insulation in the roofs and perhaps the side walls. Other transportation units are also possibilities for the same uses. Shock prevention or crash padding will probably spread from autos to industrial plants. It's a potentially wondrous field for plastics, but the rubber industry was there first and won't give up easily. It may be that each will carve out a field of its own, but it's more likely that the sponge or foam jobs will go to the industry that does the best job of selling, and they are all at it hammer and tongs right now.

One of the most interesting, although not so large growths in vinyl, is the surface coating field as distinguished from fabric and paper coating. It has been coasting along at a normal increase of 2 or 3 million lb./year but will probably show a much larger increase in 1957 and will really start rolling in 1958 or 1959.

Metal coatings made from vinyl dispersions, including plastisols and solution resins, became really prominent in 1956. One of the products was a spray-on finish that gives a textured or embossed appearance. It is being used on auto dashboards, office machines, metal television cabinets, and various other types of housings and metal panels. Alkyds have had most of the market before, but vinyl producers claim their resin is more flexible and will wear better. The 1956 price drop in vinyl resin was a prominent factor in acquiring this market.

The most radical development in coatings, however, was what is virtually spread coating of a dispersion or plastisol on steel. Its advantages include application to steel of a decorative coating with excellent abrasion-resistance and a flexibility that permits fabrication of the steel without cracking the coating. Auto fenders can even be stamped out from this coated steel. It is also claimed to be a much simpler process than laminating vinyl sheeting to steel. The coated steel price reportedly will be 18 to 30¢ a sq. ft. compared to the vinyl-steel laminate at from 50 to 57 cents.

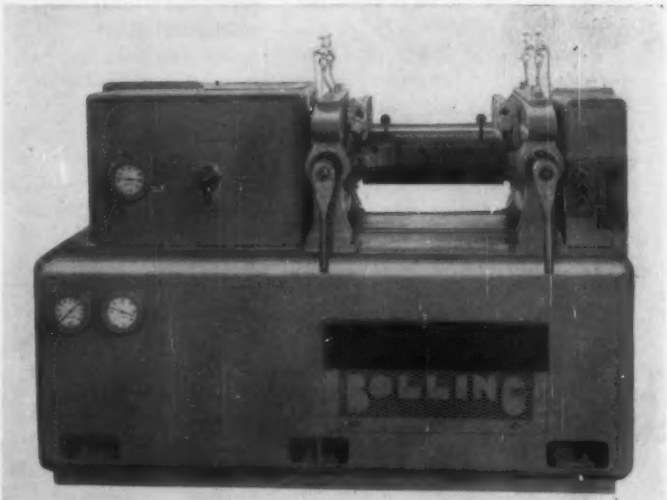
Other coating uses in 1956 that became fixtures with ever-increasing market possibilities were plastisol coatings over fibrous glass yarn for screen-cloth, and plastisol coatings to protect glass aerosol bottles from shattering. Ten and one-half million glass aerosols were sold in 1955. But the application of the vinyl skin to the glass itself still needs considerable technological improvement.

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New York 17, N. Y.
Chicago 6, Ill.
Detroit 7, Mich.
Boston 11, Mass.
Cleveland 13, Ohio
Rochester 5, N. Y.
Gainesville, Fla.

haven't grown as fast as expected. Their use for protecting the surface of aluminum and steel sheet in transit looks highly promising. One company even left it on while drawing a kitchen sink in order to protect the surface all the way to the kitchen where the end user could strip it off after installation.

Beer can use, the first commercial vinyl coating application, is still growing. There were more than 8 billion beer cans produced in 1956. The same coating applied to soft drink cans is still in development, but it is difficult to teach a new technique to the thousands of local bottlers scattered throughout the country. Maintenance coatings for such things as vats and railroad or truck tank vehicles continue to show steady growth. Coatings for agricultural uses have been disappointingly small. Poundage of resin for nearly all coating jobs is comparatively low per unit job because a little resin will cover a relatively large area of surface.

While on the subject of coatings, it should be noted that Table VIII shows a continuing small gain for paper coating. Largest gain among newer uses was in vinyl-coated cups and containers for ice cream, cottage cheese, and delicatessen dishes. These applications were in big volume for the first time in 1956. The vinyl supplants wax and is completely tasteless. Shelf cover paper remains the largest application for vinyl in this field. The milk bottle coating hasn't grown very much. The resin used for coated paper in floor covering is reported in that classification—only one company uses it, but its use is substantial.

Rigids still developmental—No review of vinyl is complete without mention of what is still considered one of its most promising future markets. Rigid pipe is estimated to have doubled in 1956 with a total of 6 million lb. or more of resin consumed. Highlight of the year was the start of the Navy program for washdown pipe on shipboard after exposure to atomic fallout. Chemical plant installations are growing nicely and it is still expected that vinyl will eventually prove its worth in the oil fields, but years of tests are needed. Vinyl unplasticized sheeting didn't progress very far in 1956, but confidence in its future is high.

Laminating moves ahead—For several years it has been obvious that plastics would be the beneficiary of a great new market when all industry learned how to combine them with other materials. The evidence is here that that time has arrived for vinyl chloride. The over 35% advance in resin used for sheeting in 1956 is due largely to the use of sheeting for laminates. Much of it was laminated to fabric for upholstery, in which field it is competitive with calendered and spreadcoated fabric, but there is a growing use for vinyl laminates in many other fields than upholstery. Counter tops, wall coverings, and combinations with metal are some.

Several of the large suppliers of automotive upholstery are now concentrating on laminates. Some of the advantages are: sheeting spoiled during a calendering op-

eration or otherwise can be reclaimed—a spoiled coated fabric is a total loss; short runs on calender-coated fabric are uneconomical and thus prevent a wide variety of design; the laminating operation can be started at any time without starting up a calender; laminating works better on stretchable fabric which, held under tension on a calender operation, loses part of its stretch; calender or spread coating drives a portion of the resin into the fabric and makes it a trifle more stiff.

Film, too, is being widely used as a laminate to fabric. Thin film and thin fabrics when combined by lamination offer an interesting possibility for various types of high-style merchandise. This laminating procedure may yet create a revolutionary trend in the entire fabric coating field and is probably the forerunner of many other plastics lamination jobs. It will bear close watching.

Elusive figures—Biggest and most elusive of all the figures in Table VIII is that for molding and extrusion resins. There is a possibility that the tabulation, which is a guesstimate for separating end uses, contains several million pounds of reprocessed material. There is a wide variance of opinion among producers on how this big chunk of vinyl is divided. Wire coating, for example, is always a bone of contention. All agree that it increased in 1956, but differ on how much. Wire coating fell off in the summer and didn't come back strongly in the fall. Decline in housing was met by use of more wire in industrial construction; more vinyl-coated wire is also being used in telephone systems each year. Automotive and appliances usage fell off due to declines in those markets. Military use is less than 10% of the total and it was in this field that vinyl wire coating really made its debut during World War II.

The export and miscellaneous figure in Table X, p. 102, is an attempt to account for resins that can't be accounted for otherwise. All other figures are maximum—no one will go higher. The estimated 8 million lb. of export is *not* a duplicate of that reported under "Miscellaneous" in Table VIII, p. 100, although some companies report exports in the "molding and extrusion" classification.

Film, sheeting, and fabric coating are so closely bound together in statistics and in processing that they can be considered as one group. Film and coating were both a little behind 1955 at mid-year, with three low months in May, June, and July, but came back in August and the balance of the year so that they will probably run a little ahead of 1955. For practical purposes, film and sheeting should be considered together in total volume of resin consumed.

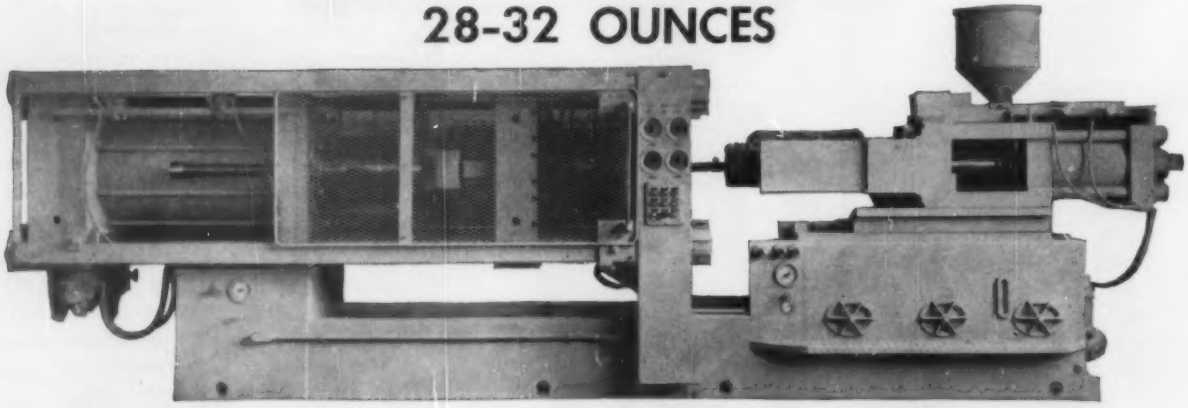
Most of this combined 150 million lb. or so of resin is for calendered plasticized film and sheeting. Some 7½ million lb. of the above is thought to have been used for extruded and cast film. That amount of resin would account for some 3 million lb. of extruded film and 7 million lb. of cast film. Another 7 or 8 million lb. is estimated for unplasticized calendered sheeting.

Thin extruded film is used primarily for packaging where clarity is desirable, such as sheets

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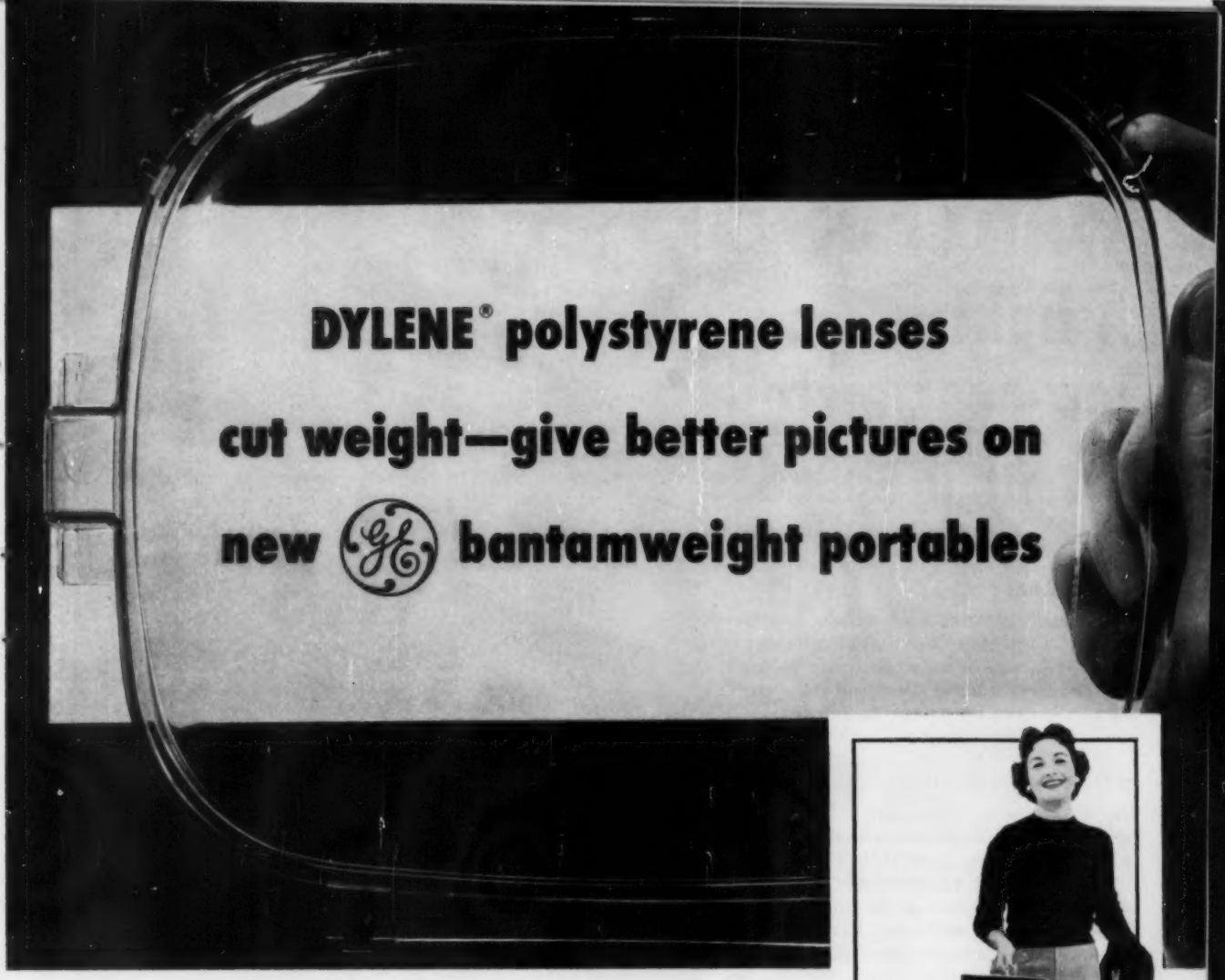


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Clamp Stroke	Adjustable to 30 inches
Machine Cycle	250 per hour
Motor	60 HP — 220/440V — 60C — 3 Ph

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and pillow cases, for shelf covering, and storm windows. Cast film is used for oxygen tents, glass substitutes, in the garment industry, surgical tape, storm windows, skin packaging, and a small amount in seat covers. Price comparisons are: cast film, 87 to 89¢ a lb. for large orders; $1.00 for small orders; extruded film, 60 to 69¢ a pound. The list price for calendered film is 50½¢, but discounts in general practice often bring it down below 45¢. The average is close to 47½ cents.

Among the highlights in the film-sheeting classification were its use as laminates previously described and the comeback of inflatables. Film and sheet for laminates must have used up 10 million lb. of resin or more. Inflatables probably consumed around 8 million pounds. This material is probably listed in Table IX on page 101.

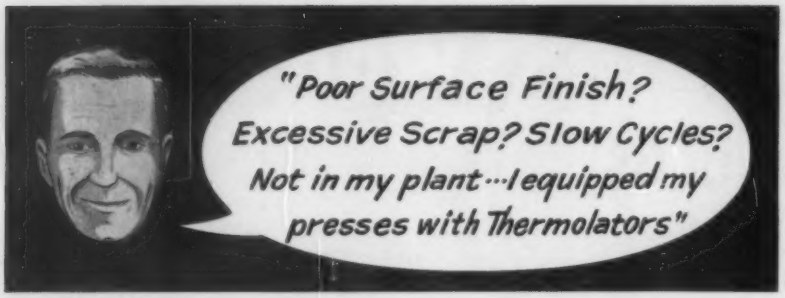
An interesting development that could lead to other applications was the growth of transparent auto seat covers made largely from calendered sheeting and then polished by running through rollers just as it came off the calender. Some 10 or 11 million lb. of resin may have been used for that purpose in 1956.

Adhesive-coated vinyl film for shelves, decoration, and walls also made a nice gain in 1956. There are now eight companies in the business compared to one in 1955. The drop in draperies noted in Table IX has been going on for several years, but part of the poundage decline is due to use of 2- or 2½-mil film instead of the 4 mils.

The industrial uses are low in Table IX only because some of them have been moved up into other classifications such as electrical tape. Great expectations are being built on this classification. Some of the possibilities are ditch dams, rear windows in convertible cars, spiral hose, silos, etc. Many of these uses will, of course, require sheeting, but laminated film may work well too. An outstanding new industrial use in 1956 was auto floor mats made of a specially compounded vinyl film.

The fabric coating resin business increased even though automotive upholstery was down and laminates moved in to take over part of the market. But during this procedure, calender-coated fabric moved ahead of spread-coated. The amount of resin used for calender coating was estimated at about 32 million in 1956; spread coating at about 25. The change came during a period when business was slack and management cut off part of the spread coating because calendering was so much faster. In addition, there is a 3¢ difference in price between calender and spread-coating resins. The thick 30- to 38-mil coating on fabric used for heavy automotive upholstery has nearly always been calendered but is now threatened by development of laminates.

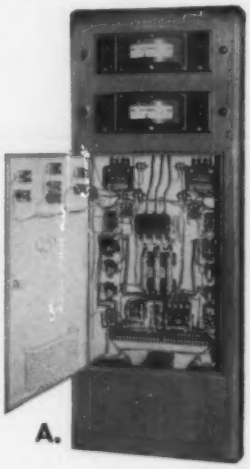
In floor coverings, vinyl asbestos tile still leads the field. Total resin used should be around 100 million lb. in 1960.—End

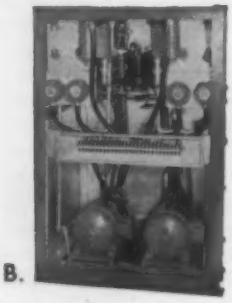


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Polyethylene

(*From pp.* 103-105)

laboratory equipment pieces such as graduates and funnels, are now on the market. A notable property of these items made from Hercules material, aside from stiffness and high heat resistance, is its good color.

Phillips Chemical Co.'s polyethylene has been around in fairly large sample quantities since midyear. The company planned a sizable increase in its pilot plant production during the fall months and expects to have the first increment of its 110 million-lb. plant on stream in early 1957. Celanese and Grace Chemical, Phillips licensees, also expect to have plants in operation in late 1957. M. W. Kellogg, another licensee, has made no announcement concerning progress.

Texas-Eastman and Spencer, both licensees of Standard Oil of Indiana, are building pilot plants in order to learn how to apply the laboratory knowledge of Standard. Standard spokesmen have said it does not expect to build a commercial or even a pilot plant. It is not likely that any of its licensees will have a commercial plant before 1959, if then. Goodrich-Gulf has said nothing as yet but is still expected to have a large plant in operation before 1960, maybe by 1958. Bakelite or Union Carbide has started construction on two plants with a capacity of 55 million lb.—one will make Ziegler-type, the other Phillips-type. These plants are expected to produce commercial quantities in 1958. Monsanto and Dow are both working on low-pressure processes but have made no statement on when commercial production is expected.

Total capacity still a question— It is difficult to determine what the capacity of the low-pressure processors will be from the above information. If plans go according to schedule, there will be 250 million lb. or more of capacity ready to go by the end of 1957 or early 1958. Thus the total capacity for all types polyethylene at the beginning of 1957 will be somewhere around 650 million pounds. But by the end of the year or early in 1958, total capacity will be over

1 billion lb. if all the low-pressure processors come in who say they will and if U.S.I. gets its high-pressure capacity up to 100 million pounds. Of this total, 800 million lb. will be in high-pressure process plants.

But that isn't all. There is 165 million more lb. of low-pressure capacity planned for 1958 or 1959 which makes present planned capacity by 1960 more than 1.2 billion lb. and this figure does not account for any low-pressure plants that may be built by Du Pont, Dow, Monsanto, Texas-Eastman, and Spencer, all of which have announced expectations of building low-pressure plants but have not said how big. Of the 1.2 billion-lb. figure, 800 is scheduled to be high-pressure and around 450 low-pressure.

Problems ahead—There is some doubt that all of the proposed 250 million lb. of low-pressure process capacity will be operating in 1957. Getting the plant built and equipment installed is only part of the job. Past history indicates that many months of trial and error are required before a satisfactory resin is produced. There are also some ethylene supply problems involved. And then the processor must learn how to use his equipment. The problem of eliminating contamination by the catalyst has already proved difficult. One producer guesses that if 700 million lb. of polyethylene is sold in 1957, not more than 50 million of it will be low-pressure material; he points out further that the premium price it draws may be a severe deterrent.

If the sales figure for all polyethylene is to catch up with that 1 billion-lb.-or-over capacity in 1960, the graph on page 103 and Table XI on page 104 show the problem that will confront sales managers in the immediate future. The 1956 to 1960 sales curve is a mighty steep ascent for an industry that is already selling 500 million lb. of material and has already established its markets, even though all of them are still growing nicely and some are branching out into new areas. The 1960 estimate in Table XI is given only to indicate how sales must grow in each classification if the goal is to be reached: most of

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them must triple or quadruple in four years' time . . . and they are starting from an already sizable market!

Exports are huge—Still another important point is the huge export figure. It is so big that many people refuse to believe it, even though it is printed in plain sight under "resins NEC" in the Census Bureau's export statistics. Volume of "resins NEC" has been running from 10 to 15 million lb. a month from January through September of this year and most of it is polyethylene. The last three months' figures were not available when this was written, but they will be big if estimators are right.

The curious fact is that company executives will emphasize how all their competitors are shipping "great gobs of stuff" overseas, but they refuse to be realistic about the total size of the "gobs." Much of the export is Grade B material but satisfactory for many pipe and molding operations. The Canadians, by far the biggest importers, accounted for almost 20 million lb. in the first eight months. Japan took over 11 million lb. in that period. Germany, France, Mexico, Belgium, and Sweden were next in order. The Japanese in particular have lately become quality conscious, too; they want film resin and the better pipe grades.

There is, of course, nothing bad about having a big export market, except there is no telling how long it will last unless the Americans can sell at lower cost. That could happen because the ethylene situation in the U. S. should be better than in countries where petroleum is not plentiful. On the other hand, foreign tariff, political, and dollar problems could shut off the imports, particularly when various countries have plants of their own.

Chances are that the export market will be good for at least three or four years. If not, the sales situation in the United States is likely to be considerably different; as Table XI shows, around 25% of sales is for export.

Two "shockers"—Two unusual circumstances enlivened the polyethylene situation in 1956. First was the announcement that polypropylene, a material similar to polyethylene but with even greater stiffness and higher heat resistance would soon be on the market. The other was the announcement that higher density polyethylenes produced by the high-pressure process were ready for market with properties approaching those of low-pressure processed material.

The first announcement concerning polypropylene was made by Montecatini, an Italian firm, which stated that it would have a commercial plant on stream in Italy in 1957. Montecatini also offered to license American companies, but no such agreements have been announced as yet. Later developments indicated that Phillips and Standard of Indiana had also developed methods for producing polypropylene and that the monomer may be used as copolymer with ethylene to produce a film-grade resin similar to conventional polyethylene. There are





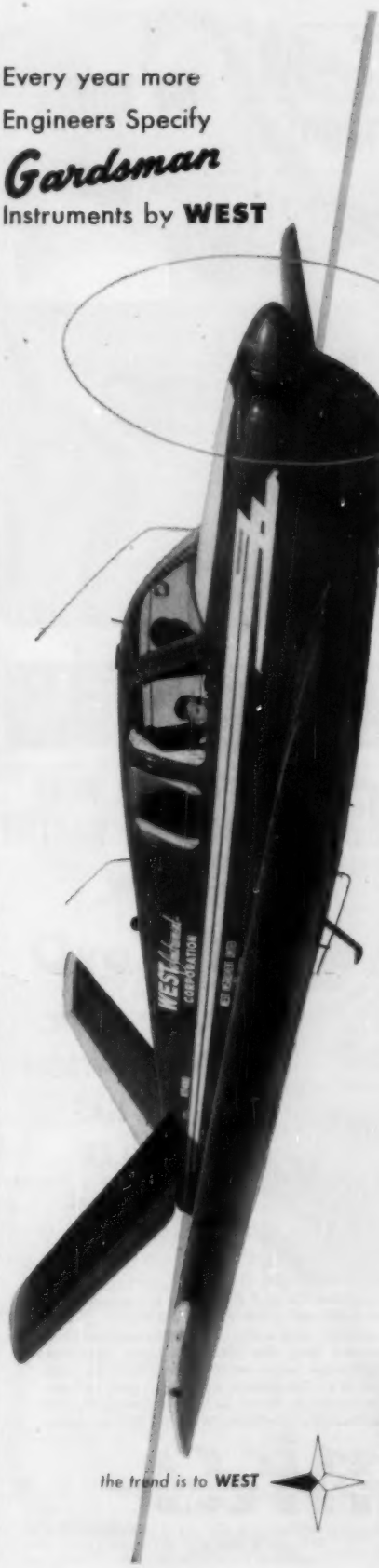
several other American companies working on propylene polymers and it is probable that there will be announcements in 1957 that commercial production of polypropylene is close to realization in the United States. Eventual cost of the resin is, of course, still undetermined. The Italians seem to be particularly interested in polypropylene as a fiber because of its great strength, but the Americans seem to be leaning toward its molding and extrusion possibilities as well as copolymer uses.

However, the impact of the new organo-chemical catalyst system on the plastics industry will be far more important than simply making possible the production of polyethylene and polypropylene by a low-pressure process. The new system has been used principally for polymerizing olefins, but the chemists are unanimous in the belief that the method will eventually be used in the polymerization of many other materials. They feel that the emphasis should be placed on the discovery of a new method rather than on new materials.

The second "shocker" in 1956 polyethylene news was the development of higher density resins in conventional high-pressure equipment. Most of the conventional material had a density of from 0.914 to 0.923 compared to low-pressure processed polyethylene with a density of from 0.945 to 0.960. The new intermediate-density materials generally range from 0.930 to 0.940, although the trade has set no sharp dividing line. One company calls its 0.922 an intermediate-density resin since it is higher than the more commonly used under-0.920-density material.

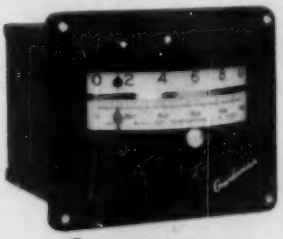
What density means—As density goes up, the properties of heat resistance, stiffness, permeability, clarity, and tensile strength are improved, but at some sacrifice of such properties as flexibility, impact, and brittleness. Thus the new resins can be used for articles that need to be boiled (nursing bottles, for example) with little danger of distortion, but in some cases they are not flexible enough for such items as containers with snap-on

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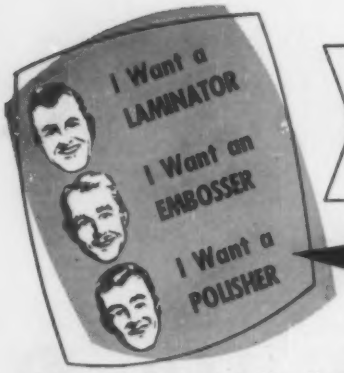


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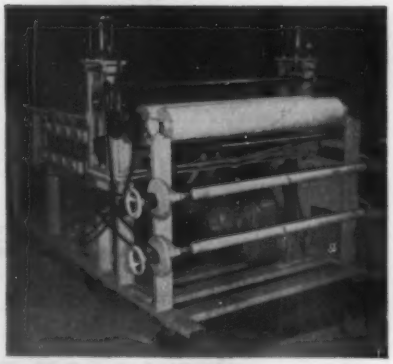
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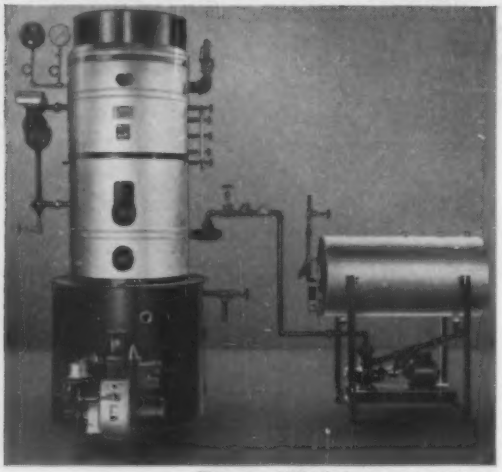


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lids. Film-grade resin made from intermediate-density material has more clarity but may break if loaded too heavily, and there has been some blocking trouble with higher-density film. Higher-density film is useful for packaging where clarity, but not necessarily strength, is desired, but it doesn't compete with lower-density film in scores of conventional packaging applications.

The lower-density intermediate ranges, sell at the same price as conventional polyethylene and are rapidly gaining momentum. The high-density intermediates command a premium price and have not yet gained a toe-hold in the industry.

The base price for standard polyethylene is now 41¢, less 10% discount. Pipe grade resin is 37½¢ and there is a premium grade that is 38 cents. Export prices are said to vary, depending somewhat upon commission paid to the exporter. The polyethylene price situation in other commodities would be termed as "less than firm."

Progress in low-pressure process polyethylene—There hasn't been much low-pressure process polyethylene in evidence in 1956, although there has been much development work by producers and processors. Here are some of the things that development men are saying about progress:

More emphasis is being placed on this material as a new plastic which will not necessarily cut deeply into conventional polyethylene products, except in moldings. In the molding field, present experience indicates that more experience is needed, particularly to take advantage of thin walls. The new, stiffer material can be molded just as fast as the older, but at higher temperature. The new material sets up faster and indications are that it needs a faster ram. If properly handled, it could make an ideal heat-resistant, rigid, expendable cup for vending machines with a wall thickness of about 0.0010 in. compared to 0.0016 in. in other materials. Thin walls require less material and therefore decrease cost.

Wire coating possibilities of high-density material are bright. Producers claim it has better heat,



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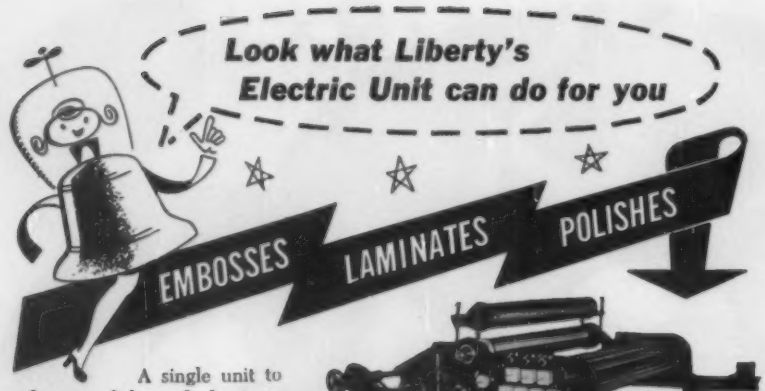
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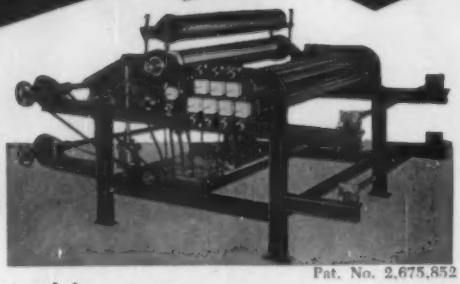
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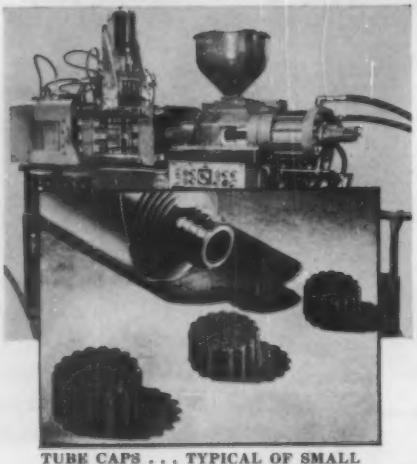
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cut, and abrasion resistance than the older polyethylenes and much better oil resistance. Electrical properties are admittedly not quite so good, but for such things as power transmission lines the use of carbon black in both materials wipes out that difference. Abrasion resistance is so good that high-density polyethylene can be used as tree wire.

Filaments made from high-density polyethylene are among the strongest of man-made fibers—strength goes as high as 140,000 p.s.i. Rope made from fibers is already on the market—unusual property is that it floats. Seat covers made from the filament have now been on test for several months.

There is a belief that high-density polyethylene will compete with rigid vinyl pipe in fields such as food processing where steam sterilization is used. But there are still lots of problems in this application.

The better impermeability and other properties of high-density material make it a good prospect for coating paper or foil and for use in non-squeezable bottles. Paper coated with this polyethylene may even be used in military ration kit wrappers to take the place of the present foil-paper-scrim laminate.

Film is the field in which there is most speculation on the future. New experimental film now being shown is far superior to the earlier examples, but it is probable that changes will have to be made in today's extrusion techniques before the problem of brittleness under load is conquered.

But there are other factors that could make the film useful in many applications. Clarity, strength, and heat resistance are outstanding properties. Because of stiffness, it is easier to handle on a packaging machine. Because of its strength, it may be used in thinner gages. Since it can withstand steam at 250° F., it can be used for boilable food containers. Its clarity would make it usable for soft goods packaging. And perhaps it could be used for agricultural and construction purposes in thinner gages than conventional film.

The progress story for higher-

density polyethylene products in 1956 is largely one of experimentation and development. The search for markets is still developmental. By the end of 1957, there will be a better indication of how such activities can be applied to commercial production.

Product growth in 1956—Table XI, page 104, gives an idea of how and where the polyethylene industry grew in 1956. There was considerable difference of opinion among various company sales groups on how the total poundage should be divided between the various classifications. The figures printed here are an effort to adjust these various opinions and weigh them after personal interviews with various other sources. The total does not include scrap, great quantities of which are used in pipe moldings and some film.

Greatest difference of opinion centers around the export and film totals. Exports were discussed earlier. Film guestimates from various sources range all the way from 145 to 175 million pounds. But one fact is noticeable: the percentage of growth slowed down compared with the last few years and even the growth in poundage was smaller than the year before. One reason given for this situation was low profit on the part of both extruders and processors of the film who make bags and other packaging materials.

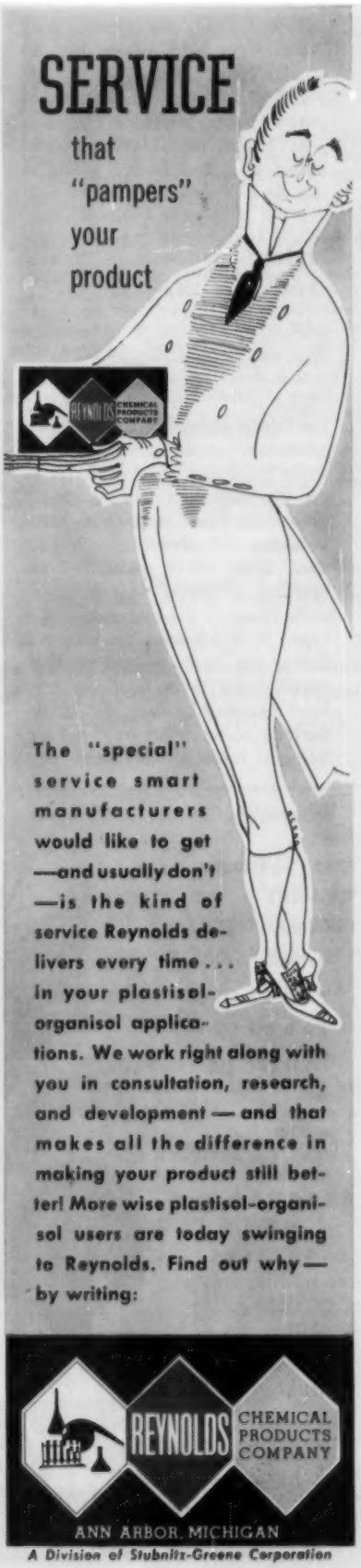
But there is no belief that film growth has been stymied. New and potentially big applications are just getting started. Among them are agricultural and construction uses. Together they may have accounted for from 12 to 15 million lb. of film in 1956, with agricultural uses probably only a million or so. So far, the principal uses are as a mulch for strawberries, covers for tomatoes, greenhouses, seed bed covers, dams for irrigation ditches, liners for farm ponds, and a few tarpaulins for crop or machinery protection.

Construction uses include tarpaulins and moisture barriers for basements and roofs. This film is often 4 mils thick, but extruders have been using a considerable amount of reprocessing material, plus their own trim in this product and thus have cut down on the amount of virgin resin used; there is also a program under way to determine the film's usefulness as a base material for construction of concrete highways, but there is as yet no assurance of its acceptance.

Sixty to 70% of the film market is now thought to be in packaging, but here are other applications, many of which are just beginning: aircraft covers, auto covers, auto seat covers for protection in transit, temporary storm windows, camel-back for tires (less than 5 million lb.), balloons, drop cloths for painters, tablecloths and drapes (some of it calendered), medical adhesive tape, shoe inner soles, sound and moisture barriers in automobile doors and bodies, and heavy sheet and slab material for atomic radiation barriers.

Vacuum forming of sheet from 10 to 100 mils thick is also a distinct possibility in the near future or just as soon as better techniques are adapted. At present the long cycle required for forming is a handicap, but the property of retaining heat which delays the cycle is also an advantage when deep draws are desired. New techniques for heat forming are now being passed on to the trade by one producer with a belief that they will open up a big new field for polyethylene containers and other items.

Guestimators are fairly close to each other on all the other end-use items in Table XI, p. 104. The chief significance is that even though the gains look comparatively small for all but wire coating, total sales for '56 were above industry's capacity to produce at the start of the year, and the rate of sales at the end of the year indicated that sales were still progressing well in comparison with new capacity added during the year. The big export and film totals contributed mightily to that achievement, but the film division is expected to contribute an even bigger portion of the increases for some years to come. The sales problem involved in the next two or three years after 1957 is indeed enormous if all capacity is to be used, but polyethylene is an enormous material; chances are good that enormous gains will continue for several years to come. In an



industry which can create a sensation from Madawaska, Me., to Chula Vista, Calif., over an application such as a million lb. of poppet beads, anything can happen. Hundreds of polyethylene uses are still not even a gleam in the eyes of inventors.—END

Nylon

(*From pp. 105-106*)

additional capacity will be for a new extrusion grade nylon to be called Zytel 42.

The new Zytel 42 is obviously Du Pont's answer to the heralded extrusion qualities of nylon-6 made from caprolactam. Zytel 42 has the same strength, abrasion resistance, and softening temperature and even higher impact than Zytel 101, a resin used for molding purposes, and a higher melt viscosity than any other 6/6 type. It is claimed to be even higher in melt viscosity than caprolactam types and to have been successfully extruded in experimental work for over a year. Some of it has already been used for automobile tubing in lubrication, in actuator rods for auto radio antennas, and in bearings. Film made from the new material can be laminated to paper, foil, and other films.

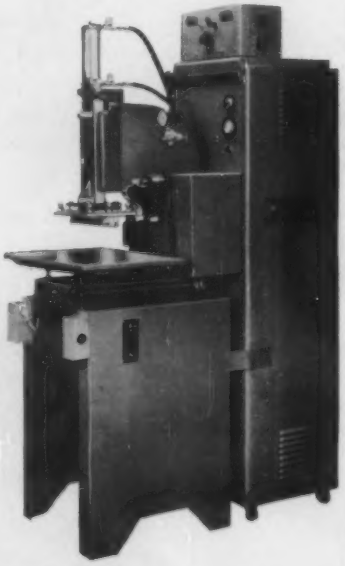
The new resin is expected to add materially to the amount of nylon used in the average automobile which is now about 0.29 pounds. Window channels, for example, as well as other extruded parts are expected to be practical in Zytel 42.

Among the most promising uses for Zytel 42 are blow molded bottles. And for nylon aerosols a new technique of spin-welding two injection molded sections has been developed by Du Pont and is being made available to the trade. It will permit production of aerosol bottles in two colors. Nylon has unusually favorable properties for aerosols, especially the cosmetic type. It is impermeable to the propellant, is not attacked by chemicals such as those used in anti-perspirants, and is not likely to shatter when dropped. There is every likelihood that nylon will loom large in the bottle and aerosol container in the next few years.

More uses for nylon of all types are certain to develop as engineers and designers gain experience in applying its mechanical properties, such as toughness, abrasion resistance, stiffness, resilience, and high heat deformation temperature. It is also likely that they will have a transparent nylon in medium thickness to work with before long. With a range of applications from wood screws to fan blades for Citroen automobiles to propellors for ships, its future seems limited only by the ingenuity of engineers.

Delrin resin. Delrin is a new resin starting with formaldehyde as a base material that is expected to complement nylon. It has very low water absorption, exceptional light resistance, and it distorts under a low load at 340° F. Du Pont is the developer but does not even have a pilot plant as yet. Commercial production is at least two years away—that is, if the company decides to put it on the market.—END

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New directions

(*From pp.* 107-115)

silos; film stretched over rough frames to provide shelter for cattle; and insulation on chicken coops, sheds, and other inexpensive farm buildings which do not need year-round protection. Polyethylene film and paper coated with polyethylene have also taken on importance as a wrapping material for roots or plants to keep them moist and healthy during the time they are shipped or held in storage.

Packaging

Emphasis on self-service merchandising in retail outlets served as the major impetus behind the push of plastics into that lucrative new phase of packaging known as "visibility" or transparent packaging. From a wide range of manufacturing industries came demands for transparent packages designed to show off a product to advantage and encourage impulse buying. The most satisfactory answer to these demands lay in the use of plastics materials in molded rigid containers, plastic film wrapping, and "skin" and "blister" packaging. (See MPL, June 1956, p. 428.)

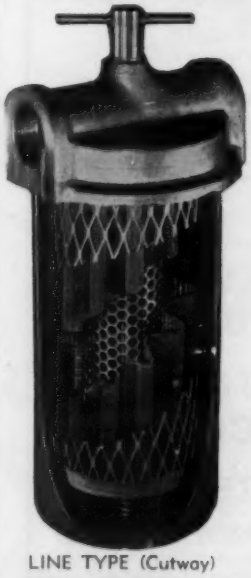
Most of the growth of molded rigid containers for packaging was attributed to the switch by the industry from the idea of plastics containers only as premium-priced re-use packages to the concept of low-cost single-shot packages designed to be discarded after each use. Sales during the year showed that housewives were willing to pay a few pennies more for superior properties. One molder of a thin-wall styrene tomato boat designed to sell for 3 to 5¢ more than conventional paper boxes reported that sales were still so good that in the Chicago area alone some 70% of the tomatoes distributed were in the styrene package. (See MPL, June 1956, p. 169.) A similar report from the ice cream industry in 1956 indicated that about 37% of all ice cream makers used clear styrene containers for their product and the idea was spreading to other segments of the food industry, including cheeses

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In the same category of low-cost disposables was the wide variety of vacuum formed containers and trays that appeared on the market in 1956. By taking advantage of continuous automatic processes, many of these units were reduced in cost to the point where they were directly competitive with paper containers. One manufacturer in 1956 was even toying with the idea of a vacuum formed polyethylene package for shell-less eggs. (See MPL, June 1956, p. 169.)

But with all the emphasis on high-volume, low-cost disposables in 1956, many observers overlooked the advances made by plastics into the field of higher-priced luxury packaging. One of the most important developments in this respect was the first molded polyethylene quality case to be used by the electric shaver industry in relatively large volume. (See MPL, March 1956, p. 120.) A molded nylon aerosol introduced at the end of the year also attracted much attention.

Flexible film packaging was another industry that had one of the biggest years in its history in 1956. By the beginning of the year, polyethylene film alone had increased almost four-fold in packaging applications from an estimated 25 million lb. in 1953 to about 97 million pounds. Saran, vinyl, and Mylar polyester film also moved into new competitive positions. But since no one of these materials incorporated all the properties necessary to package all types of products, most observers felt that the future for film packaging lay in laminations combining different types of film. "Convenience" packaging for the 5 billion lb. of frozen foods sold annually, especially those of the heat-and-eat variety, stood out in 1956 as a booming market for such laminated materials. Interesting possibilities were also predicted for a laminated Mylar-to-polyethylene film package introduced in 1956 for precooked meats—the newest branch of the heat-and-eat frozen food field. (See MPL, Oct. 1956, p. 136.) By simply dropping the unopened package in a pot of boiling water,

the housewife can prepare a complete main course in less than 12 minutes.

Building construction

Plastics structural engineering involving new architectural space and area concepts progressed to such a degree that a number of materials suppliers and fabricators actually began erecting model "all-plastics" homes designed to intrigue architects and builders with the enormous potential which plastics materials have for the field. (See MPL, June 1956, p. 164.) While most of these model homes differed considerably in design and construction, certain basic features common to each were being played up as possible forerunners to a completely new American style of architecture described as easy-to-erect, low-cost housing embodying such esthetic and functional features as spacious and unobstructed areas, mobile units that can easily be re-arranged to satisfy changing living conditions, flexible mechanical and electrical equipment, and the integration of interior and exterior areas of the house. Fitting neatly into the pattern were such applications as roofs fabricated of plastics sandwich materials and curved to span a considerable distance without support; lightweight, movable plastics panels serving as room separators; foamed plastics insulation; luminous ceilings and plastics glazing; floor areas constructed of sandwich panels with molded-in air-conditioning ducts; and modular units, such as bathrooms, in which plumbing and electric fixtures are molded-in as parts of wall, floor, and ceiling.

In the more immediate future, however, the plastics industry foresees a growing market in the building trades for those applications that have already proved themselves—wall coverings, flooring, upholstery, glazing, panelling, etc. One materials supplier introduced in 1956 a model home incorporating nearly 100 practical applications of vinyl that are today commercially feasible. These included vinyl piping, ductwork, window frames, lighting panels,

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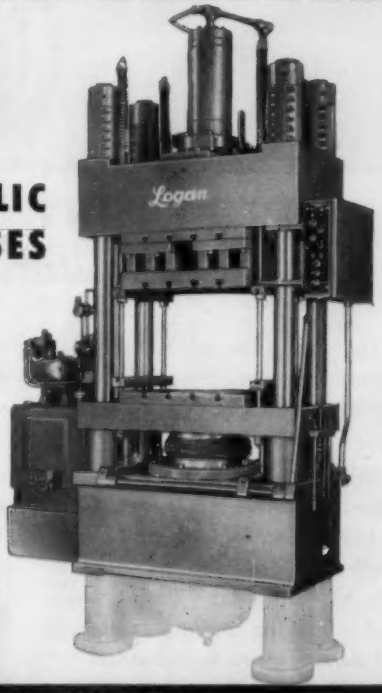
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roofing, house siding, and sliding door channels. One of the outstanding new applications in the group was a vinyl-coated radiant heating wire which can be installed in walls or ceilings before the finish plaster coat. A plastics fabricator also began building in 1956 a model "all-pastics" home following conventional design and incorporating such commercially feasible applications as foam carpet cushioning, vacuum formed vinyl wall coverings, vinyl-clad doors, formed acrylic skylights, polyethylene water pipes, nylon valves for plumbing, and resin laminate structural beams. (See MPL, June 1956, p. 164.)

Two of the newer plastics building applications which expanded in use in 1956 were foamed styrene as perimeter insulation and plaster-base material in masonry homes (See MPL, Sept. 1956, p. 252) and polyethylene film as a moisture and vapor barrier, as a means of closing in a building to protect workers from cold, rain, and snow, as an effective cover for lumber, equipment, or other materials, and as an aid in curing concrete and masonry. (See MPL, May 1956, p. 246.)

Refrigerators

Foamed plastic insulation and the concept of an all-plastic refrigerator body were the two plastics applications that injected the most excitement into the refrigeration field in 1956. For foamed polyurethane or foamed styrene, the 75 million cu. ft. of thermal insulation used annually in refrigerators looks particularly enticing. Foamed plastics, with their low *K* factor and water and vapor resistance, proved especially applicable in refrigerators based on the modern design concept calling for reduced temperatures and increased storage area. More important, in view of the trend toward the use of thin wall sections in refrigerator cabinet structure, were the structural advantages which could be obtained by foaming the plastic in place.

Foamed plastics also played a role in the design of the most radical innovation to come along in the refrigerator field in many years—the first production-line



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all-plastics refrigerator. As introduced in 1956 by a leading appliance manufacturer, the refrigerator is based on a simple sandwich construction. The exterior skin of the sandwich is reinforced plastics; the interior skin is styrene alloy; and the core is styrene foam. Because of the ease with which the new refrigerators can be produced, the industry is looking toward it as a means of accelerating refrigerator obsolescence by a continuous program of annually changing and improving product design and styling. Basically, the entire exterior cabinet is made simply by notching the sandwich panel and folding it up like a cardboard carton around a set of previously sub-assembled interior partitions. (See MPL, Nov. 1956, p. 114.)

Formed plastic inner door liners, already standard in the lines of most major manufacturers, were given further impetus in 1956 with the development of a technique for continuous automatic vacuum forming of the liners at the rate of 80 to 100 doors per hour. (See MPL, Aug. 1956, p. 119.) Manufacturers also expressed interest in the prospects for forming the door liners of the new decorated styrene sheets—in line with the modern emphasis on color in appliances. (See MPL, Sept. 1956, p. 97.)

Large-volume potential

The applications described above are by no means the sum total of the year's activities nor do they yet represent large volume. Many, in fact, were still relatively small in volume even by the end of 1956. But the potential for each is really big.

Of more significance to the plastics industry were the new design concepts that came to light as a result of the development work done with these applications. The idea of vacuum forming low-cost plastics disposable items at high speeds, for example, while originating in the housewares and packaging industries, soon began to lap over into other fields. One manufacturer in the medical instrument field introduced for the first time in 1956 a pressure-formed disposable vinyl covering for an otoscope tip. (See MPL, Nov. 1956, p. 113.)

Similarly, the success of the plastic sandwich panel in the design of buildings, trucks, and refrigerators, had set off a wave of interest in the possibilities of the material for a host of other structures where a combination of strength, light weight, and insulation was required. In the luggage field, the advances made in the forming of styrene copolymer sheet revived interest in the material for housings, seating, personal accessories, instrument cases, and a host of other consumer end-products, particularly for competition with leather. And the same outline could be traced for most of the applications described above.

If there is one thing that the events of 1956 make clear, it is that the plastics industry no longer need search longingly for broadened bases of application. They are already here.—END

1956 Highlights

(*From pp.* 129-140)

Formvac "airslip" process, reported in *Brit. Plastics 29,* 252 (July 1956) and *Plastics* for July 1956, p. 158. The more thorough treatment is the *Brit. Plastics* article, **"Modified vacuum forming technique."** In "airslip" forming, as in plug-assist, a plug is used, but here the air on the male die is trapped and there is no female mold. As the plug rises toward the clamped sheet, compressed air blows the sheet into a bubble (as in free forming). Toward the end of its stroke, the plug catches up to the almost formed bubble, the trapped air is evacuated, and atmospheric pressure forces the sheet tightly against the male mold, where it freezes. An almost identical process, called pneumatic positive forming, is described in **"Grundzüge der Vakuumverformung,"** by ***A. Thiel,*** *Plastverarbeiter 7,* 269 (July 1956). Both this process and Hydrochemie's (Formvac) are said to be patented.

Mr. Mighton explored the effects on the finished forming of plug depth, plug speed, and sheet temperature, and he noted that the trapped-air pressure was a critical factor. The others presented nothing but a description of the technique.

"Seamless hollow shapes of rubber or plastics," *Materials and Methods 44,* 114 (Oct. 1956).

Described briefly is the radically new Holofol process for forming tubing, pillow-shapes, toy animals, etc., from sheets and films. The film is immersed in a bath of swelling agents and solvents, then heated. The heat shrinks the outside, while solvent remaining in the inner regions is vaporized, inflating a formerly flat sheet into a hollow shape.

Fabricating and finishing

"Precision finishing by tumbling," by ***W. E. Brandt,*** MODERN PLASTICS *34,* 150 (Sept. 1956).

Tumbling barrels can handle economically a wide variety of plastics finishing jobs, from simple deflashing to attaining a glassy sheen. A quick look is taken at the questions: What kinds of actions go on in a tumbling barrel? How do they depend on barrel speed and size?

The potentialities of available equipment and media (tumbling aids) are discussed, along with the relative effectiveness of the different methods of deflashing, finishing, and polishing. Typical barrel sizes, loads, speeds, and cycles for plastics parts are given. Other topics covered include care and maintenance of tumbling media, and recommended auxiliary equipment.

A similar and almost as detailed an article appeared in *Brit. Plastics* for January 1956: **"Barrel finishing plastics moldings,"** by ***E. C. Emslie.***

"Choosing adhesives for plastics," by ***I. Skeist,*** MODERN PLASTICS *33,* 121 (May 1956); also, **"Adhesive bonding,"** by ***I. Skeist,***

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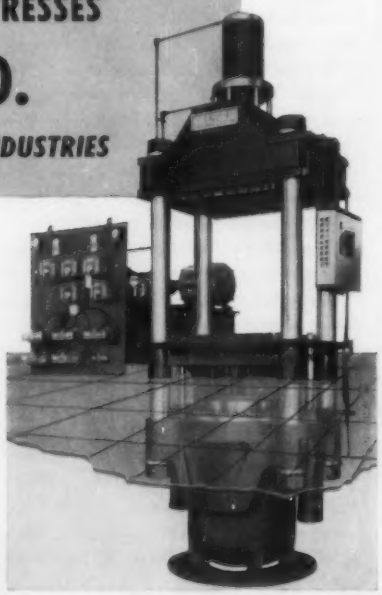
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MODERN PLASTICS *34*, 798 (Encyc. Issue, 1957).

In the magazine article, Dr. Skeist has approached the subject on a fundamental basis: crystallinity and solubility of polymers guide the selection of adhesives for bonding plastics to themselves and to other materials. Using the solubility parameters calculated by other investigators, it is possible to predict what solvents will make good bonding agents for any particular plastic system. To be strong under a variety of service conditions, bonds must be thin and have about the same elastic modulus as the adherends. To give strong bonds, adhesives must have low viscosities when applied, very high viscosities when set. Such adhesives are polymer solutions or latices, or polymerizable mixtures.

The Encyclopedia article, though based on the same thinking, goes more into the practical details.

Bonding Teflon—One of the obstacles to the wider use of Teflon has been the difficulty of bonding it, both to itself and to other materials. In the past year, two new techniques for bonding this slippery resin have become available. In **"Heat-bonding of Teflon,"** by ***P. J. Wayne*** and ***W. M. Bruner***, *SPE Journal 11*, 28 (Dec. 1955), a method is presented for achieving strong Teflon-to-Teflon bonds by direct contact heating. The surfaces to be joined must first be machined to a mating stepped contour and then smeared with a flux made up of Teflon suspended in a fluorocarbon oil. Since heaters must provide uniform temperatures of about 707° F. over the entire joint surface and must exert a pressure of about 40 p.s.i., only certain simply shaped joints are practical to join by this method. The second method is described briefly in **"Bonding qualities of Teflon improved by new treatment,"** *Materials & Methods 43*, 118 (Apr. 1956). Good adhesive bonds to Teflon may be obtained if the resin surface is first treated by immersing it in a 1% solution of sodium in liquid ammonia. 1500 grams of solution will treat about 30 ft. of Teflon tape 8 in. wide and

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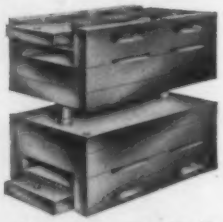
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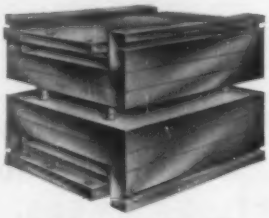
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10 mils thick, with an exposure of from 1 to 5 seconds. The tape dries on removal, but residual sodium hydroxide must be washed off with cold water. After drying, the Teflon surface is dark brown. Typical peel strengths are 35 lb./in. for Teflon-Teflon bonds, 55 lb./in. for Teflon-to-steel bonds. The recommended adhesives are mostly epoxies.

Heat sealing—A new principle of heat sealing, particularly well adapted to sealing polyethylene film—not sealable by dielectric methods—is described in **"Molten-bead heat sealing,"** MODERN PLASTICS *34*, 163 (Oct. 1956). As its name implies, a strand of hot melt from a small extruder is the sealing agent. The strand is fed between the sheets to be sealed together and immediately the three layers are pinched between lightly loaded rollers. Strong, homogeneous bonds have been made at rates up to 500 ft./min. The method will probably be most useful for making long, straight, continuous seals between films, laminates, etc., of lower-melting, heat-stable thermoplastics.

"Room-temperature bonding," by ***J. L. Been***, MODERN PLASTICS *33*, 126 (Mar. 1956).

The development of high-strength epoxy adhesives that will adhere to nearly all materials and can be cured quickly at room temperature has made adhesive bonding an attractive fastening method. The epoxy adhesives—100% solids formulations—are safe to use with plastics that are crazed by solvent cements and are themselves resistant to severe service conditions. Some have tensile-shear strengths up to 2000 p.s.i. at temperatures near 350° F.

Mold making

In a series of six articles, appearing in the February to September issues of *British Plastics*, the important methods of making metal molds are reviewed and brought up to date. Covered are hobbing, electroforming, spark erosion, copy milling and turning, casting, mold materials, and honing and polishing. Together they form an excellent primer.—END

S.P.E. Conference

(*From pp.* 144-146)

layer next to the heating cylinder wall and skimming it off produces a uniform temperature distribution in the plastic. Melt extraction heaters should be excellent for use in preplasticating systems.

Molding of Tetrafluoroethylene Resin, *by F. M. Chapman and L. T. Bunn, E. I. du Pont de Nemours & Co.*

SESSION III: Foams; *Moderator, A. Varner, General Electric Co.*

Polystyrene Foam—A Low-Density Molding Material, *by D. L. Graham, The Dow Chemical Co., Plastics Tech. Serv.*

Polystyrene — A Versatile Foaming Material, *by R. N. Kennedy and G. R. Franson, The Dow Chemical Co., Plastics Tech. Serv.* Three types of polystyrene foam are now available: pre-expanded foam and two types based on expandable polystyrene beads, one expanded by heat and the other self-expanding. The range of densities is from 1.5 to 20 lb./cu. ft. Applications of the three types are discussed.

Plastics Sandwich Construction, *by G. D. Miller and H. J. Waite, The Dow Chemical Co., Plastics Tech. Serv.* A review of sandwich structures, their properties and uses, and of the plastics that are used in their facings and cores.

Use and Application of Isocyanate Foams, *by B. S. Collins, Nopco Chemical Co.* This paper is limited to: 1) rigid and semi-rigid foams, 2) foam-in-place systems using polyesters, 3) either prepolymer material or one-shot material.

Economic and physical property differences between the prepolymer and the one-shot system are detailed. Automatic machinery to dispense foam is discussed as to whether it is necessary from the standpoint of an economically run operation. Examples are given of end uses in which hand-mixing is sufficient and of applications where machinery is required.

Isocyanate foams have a definite place in structural, insulation, buoyancy, vibration dampening, and electrical uses. Techniques for these fields are discussed.

SESSION IV: EDUCATIONAL SYMPOSIUM ON ENGINEERING MANPOWER PROBLEMS; *Moderator, R. C. Bartlett, Natvar Co.*

Speakers and topics to be announced.

Thursday morning

SESSION I: INJECTION MOLDING (II); *Moderator, G. Thayer, The Dow Chemical Co.*

Hydraulic System and Its Relation to Polymer Flow Through an Injection Molding Machine, *by O. M. Hahn and J. B. Broussard, E. I. du Pont de Nemours & Co.* A study has been made of the hydraulic system in an injection molding machine. The interrelationship between the performance characteristics of the hydraulic system and the polymer flow has been established with the use of special instrumentation. From the analysis it is shown that under certain operating conditions the hydraulic system may be the limiting factor in performance. One such example would be hidden oil leaks within the hydraulic system which can be detected only with proper instrumentation or careful inspection.

Pressure Measurement in Injection Molding—Use of Ejector Pins, *by P. D. Kohl, E. I. du Pont de Nemours & Co.* Pressure-sensing elements designed specifically to measure the plastic pressure in an injection molding machine are described. Pressure in the mold cavity is proportional to the load on one or more of the ejector pins in the mold. With strain gages cemented to the pins, the pressure in the mold can be determined with an accuracy of 50 in 15,000 p.s.i. The nozzle pressure is measured by the same general principle except that the strain gages are thermally insulated from the pressure-loaded pin. The nozzle pressure gages can measure a change of about 100 in 20,000 p.s.i. total.

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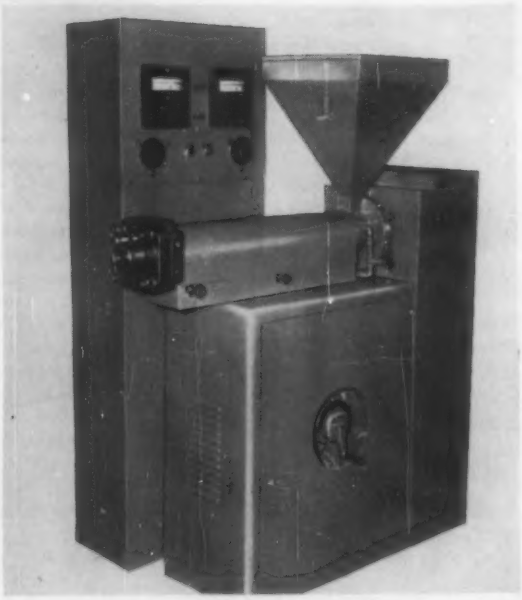
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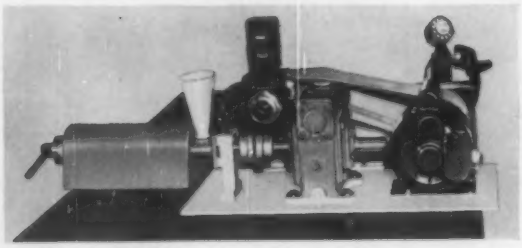
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this Compressibility on the Flow Properties, *by B. Maxwell and S. Matsuoka, Princeton University.* The significance of bulk compressibility as it pertains to the fabrication of plastics by injection molding and extrusion are discussed. All plastics so far studied exhibit a high degree of compressibility in the range of temperatures up to molding conditions and in most cases the bulk modulus has been found to be non-linear and non-ideal. Evidence indicates a phase change in polyethylene upon the application of pressure. An increase in temperature increases the pressure required for this phase change to take place.

New Gating for Acrylics, *by J. F. Moore, Rohm and Haas Co.*

SESSION II: EXTRUSION (II); *Moderator, G. Prall, Western Textile Products.*

Shape Extrusion Studies of Nylon Resin, *by K. G. Toll, E. I. du Pont de Nemours & Co.*

Rigid Thermoplastics Piping, *by R. K. Multer, Marbon Chemical Co.* This paper describes techniques for designing piping systems of the newer, high-impact thermoplastics. Questions about burst strength, chemical resistance, methods for joining, and other important characteristics are answered. "Effective tensile strength" is explained and this value is given for Cycolac, an acrylonitrile - butadiene - styrene plastic. Also included is a convenient table of effective, long-term burst strengths for IPS and SWP pipes, which can be used with any plastic for which effective tensile strength is known.

Applications of Extrusion Theory, *by R. E. Colwell, Monsanto Chemical Co.* Extrusion screw design procedures based on the fluid dynamics of Newtonian melts have been reported in the literature. Two limiting cases have been considered: 1) isothermal operation and 2) adiabatic operation. The purpose of this paper is to present a simple relationship between these theories and to adapt these theories to convenient extruder screw design procedures. Particular emphasis

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is given to the problem of screw design for the case in which the melt temperature rise must be limited.

Nylon-6 Extrusion, *Spencer Chemical Co.*

SESSION III: APPLICATIONS; *Moderator, A. Lightbody, U. S. Naval Ordnance.*

Vinyl-Clad Steel, *by G. E. Wintermute, Arvin Industries, Inc.* Vinyl-clad steel offers the metal fabricator a new material. It is a material that combines the beauty and durability of vinyl plastic with the strength and ease of formability of steel. Four major advantages of this material are: 1) The metal is coated continuously in the flat. 2) Printed, embossed vinyl can be used. 3) The appearance and properties of the film are unaffected by the process. 4) The bond between the vinyl and the steel has sufficient integrity to withstand subsequent punching, drawing, and forming operations.

Vinyl-clad metal laminates possess some limitations in fabricating and in service. They need to be recognized and respected.

A Method of Testing Quality of Phonograph Records, *by N. J. Gifford and P. C. Woodland, The Dow Chemical Co.* Polystyrene, now an important hi-fi record material, must be formulated with lubricants to get the desired wear and playing characteristics. Formulations can be checked by molding against a test-record stamper that has critical test grooves; particularly useful are the intermodulation (IM) grooves. Quantitative measurements of IM distortion enable one to formulate reliably and to determine optimum molding conditions. IM distortion tests are compared with subjective listening tests.

New Fabrication Techniques for Flush Circuitry, *by P. E. Ritt and E. L. Ditz, Melpar, Inc.* The paper is a discussion of three methods of making dual-sided flush circuits with side-to-side registry. The three selected processes investigated were: 1) the use of adhesive backed cop-

(*To page 242*)



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POLYETHYLENE MANUAL. 60-page manual includes charts, diagrams, illustrations of applications and properties of "Alkathene" polyethylene. Describes compounding, extrusion, molding, handling techniques. Imperial Chemical Industries, Ltd. **(A-704)**

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PRODUCTION TIMER. Literature illustrates and describes equipment that continuously computes and registers total operations time of any machine, operation or process in chart form. Illustrates accessory equipment. Standard Instrument Corp. **(A-708)**

STABILIZERS FOR VINYL RESINS. Literature describes five stabilizers that provide light stability, reduce discoloration in films. Suggested for vinyl chloride and vinyl copolymer resins. Includes specifications. Victor Chemical Works. **(A-709)**

AUTOMATIC COMPRESSION PRESSES. 12-page booklet describes and illustrates design features, and applications for line of fully automatic compression presses with 50, 75, 125, and 200 ton capacities. Includes specifications chart. F. J. Stokes Corp. **(A-710)**

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CARBIDE TIPPED SAWS. Folder illustrates and describes line of carbide tipped saws, including rip, planer, double bevel, tri-cut, and gang rip types. Prices included. Lemmon & Snoap. **(A-713)**

CORRUGATED SHIPPING BOXES. Booklet describes steps this company takes in the manufacture of corrugated shipping containers for specific uses. Includes check list for container selection. Hinde & Dauch Paper Co. **(A-714)**

WEB EXPANDER-ALIGNER. Folder describes unit that provides automatic width control and windup edge control in continuous web operations. Handles 50 to approximately 300 lb. rolls. Includes blueprints of specifications. C. A. Litzler Co., Inc. **(A-715)**

VACUUM FORMER. Literature describes combination drape and vacuum former with 30x30 in. capacity that can drape draw to depth of 16 in. Size of machine is 32x32 in. x 7 ft. Kroll Equipment Corp. **(A-716)**

VACUUM METALLIZING. Catalog describes method of applying metal coatings to plastic. Includes illustrations and specifications for company's line of vacuum metallizing equipment. High Vacuum Equipment Corp. **(A-717)**

LABORATORY VACUUM FORMER. Data sheet describes portable hand operated vacuum forming machine suitable for laboratory use. Has 2 in. depth of draw and handles 10x10 in. sheet sizes. Precision Products. **(A-718)**

PARTS MARKING MACHINES. 6-page folder describes line of machines that mark letters and numbers on plastics or steel and metals. Illustrates and gives specifications for hand and motor operated units. The Acromark Co. **(A-719)**

UREA FORMALDEHYDE CONCENTRATE. 36-page handbook provides data on physical and chemical properties of a liquid U.F. concentrate. Discusses applications with plastics, adhesives. Allied Chemical & Dye Corp., Nitrogen Division. **(A-720)**

TESTING EQUIPMENT. 28-page booklet describes line of instruments suitable for testing tensile strength, temperatures, strain of plastics materials, and equipment such as electronic recorders and balancing machines. Tinius Olsen Testing Machine Co. **(A-721)**

ROTATIONAL MOLDING OF PLASTISOLS. Literature describes units for rotational molding of vinyl plastisols. Consists of gas operated oven with two 24 to 30 in. diameter mold holders mounted on a planetary drive. Also describes accessory equipment. Mercury Conveyor, Inc. **(A-722)**

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GRINDING TOOL CATALOG. 20-page catalog contains illustrations, specifications, diagrams, prices of line of diamond and carbide grinding tools including grinding wheels, core drills, cut-off blades and files. Starlite Industries, Inc. (A-727)

PLASTICS WELDING. Literature describes pistol-like hand tool for welding plastics through the use of high temperature gaseous heat without flame. Applicable for welding plastic sheet, spot heating, heat sealing, or for machine applications. D & R Plastic Welders Inc. (A-728)

LAMINATING RESINS. Literature describes line of phenolic-type resins formulated to meet special requirements in cloth and paper laminates for electrical resistance, mechanical strength, low water absorption, and decorative qualities. Synvar Corporation. (A-729)

PLASTICS DEFLASHER. Folder illustrates and describes automatic machines that employ blasts of non-abrading pellets to deflash a wide variety of plastics parts at high speeds. Wheelabrator Corp. (A-730)

STOCK VINYL TUBING. Folder describes flexible transparent non-toxic vinyl tubing. Includes specifications chart, prices. Mayon Plastics. (A-731)

POLYETHYLENE RESINS. Data sheets describe company's line of special purpose polyethylene resins suitable for such applications as general molding and extrusion, film and laminates, pipe, electrical applications. Includes prices. Spencer Chemical Company. (A-732)

MOLD STEEL HANDBOOK. 42-page handbook serves as a guide to the selection, application, and heat treatment of company's mold steel. Carpenter Steel Company. (A-733)

CUSTOM PLASTICS PROCESSING. 12-page booklet describes and illustrates New Engand company's facilities and equipment for extruding, injection molding, compounding and blending, heat sealing. The Lawrence Process Company, Inc. (A-734)

PAYMENT PLAN FOR INJECTION PRESSES. Folder describes deferred payment plans for the purchase of company's injection presses and accessory equipment. Short term and long term plans are discussed. The Fellows Gear Shaper Company. (A-735)

ACETATE FILM. Sample booklet displays swatches of company's transparent and multi-colored acetate film. Discusses properties, suitable applications and thicknesses available. Celanese Corp. of America. (A-736)

VINYL CALENDERING COMPOUND. 14-page manual describes "Vygen 2201," an uncolored modified rigid polyvinyl chloride compound for calendering operations. Includes charts of physical properties, chemical resistance. General Tire and Rubber Company. (A-737)

SPRAY PAINTING EQUIPMENT. Bulletin describes a large automatic spray painting machine, designed to spray areas up to 12 inches wide and 40 inches long. Conforming Matrix Corp. (A-738)

PLASTICS FILMS MACHINERY. 24-page illustrated booklet describes a line of web processing machines, including models suitable for the coating, cooling, laminating, printing, and general winding of plastics films. Dilts Division, Black-Clawson Co. (A-739)

CATALOG OF INJECTION NOZZLES. 42-page illustrated catalog gives specifications, schematic drawings, and prices for an extensive stock of replacement and special-purpose injection machine nozzles. Injection Molders Supply Company. (A-740)

STYRENE AND VINYL RESINS. Illustrated booklet describes uses and typical properties of "Plio-Tuf" company's new group of high styrene resins, and ranges of uses of the "Pliovic" group of vinyl chloride resins. Goodyear Tire & Rubber Company. (A-741)

ELECTRIC HEAT IN PLASTICS PROCESSING. 34-page booklet describes many cases where company's strip, ring, tubular and cartridge heaters were used successfully by plastics processors for preheating, drying, curing, fusing and other purposes. Edwin L. Wiegand Company. (A-742)

HIGH INTENSITY INFRARED LAMPS. Folder describes company's new line of quartz lamp oven sections for high temperature —short cycle applications. Includes diagrams of specifications and installation possibilities. The Fostoria Pressed Steel Corporation. (A-743)

SMALL INJECTION PRESS. 28-page brochure describes line of small (one ounce or under) vertical presses for injection molding. Models are available with air or hydraulic systems. Specifications, price schedules included. Newbury Industries, Inc. (A-744)

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per foil in producing a subassembly which was subsequently laminated to uncured reinforced plastics; 2) the transfer of a reverse-plated circuit from a stainless steel platen to uncured reinforced plastics; 3) the superficial adherence of copper foil to uncured laminates.

Method (2) was found to yield fairly reliable laboratory results while method (3) was found to be unusable. A step-by-step procedure for the successful method is presented.

Stability of Nylon Parts in Business Machines, *by B. W. Nelson, National Cash Register Co.* Business machine parts are constantly starting and stopping, often in very short times. This brings in many undetermined inertial loads, which make it necessary to try out a proposed plastic part in test machines before adopting it. Because such machines are used in many different climates, the high moisture absorption of nylon had to be considered. Nylon was tested for wear, surface finish requirements of mating steel parts, and effects of humidity on part dimensions.

It was found that 1) at low loads nylon wore least rapidly against nylon, while at high loads it wore least rapidly against steel; 2) steel parts mating with nylon must have a surface finish of 30 μin. or better and must be free of burrs; 3) at humidities of less than 50%, dimensional changes are very small, while substantial changes occur at humidities over 79%, and these changes are reversible.

Thursday afternoon

SESSION I: REINFORCED PLASTICS (I); *Moderator, R. J. Savage, Celanese Corp.*

First speaker: to be announced.

The Problems of Fittings to Match the Performance of High-Pressure Reinforced Plastic Pipe, *by H. D. Boggs, The Fibercast Corp.*

Plastic Compressor Rotor Blades for Turbo Jet Engines, *by John F. Kulp, General Electric Co.*

Molding Thick Glass-Rein-

forced Polyester Laminates, *by F. Claudi-Magnussen, Hooker Electrochemical Co.*

SESSION II: INSTRUMENTATION; *Moderator, D. C. Walley, K-S-H Plastics.*

A Study of Thermocouple Location and Watt Density in the Injection Molding Heating Chamber, *by Robert Dahl and Robert McKee, The Dow Chemical Co.* The electric heat which is used on virtually all injection molding cylinders is usually controlled by thermocouples. Two injection heating chamber barrels were equipped with 25 thermocouples to study the effect of control location on the uniformity of temperature. The machines were operated under a variety of conditions.

These tests showed that the watt density should be graduated along the cylinder according to the load. This produces good temperature uniformity for any set condition with two-zone control, but when conditions are changed, the uniformity is upset. The correct distribution of wattage can be calculated, but this is laborious and a simplified method is given.

Pressure Control for Injection Molding Machines, *by C. E. Beyer, The Dow Chemical Co.*

Platen Press Temperature Control, *by J. C. Stansel, General Electric Co.*

Advantages of Dual Thermocouples in Injection Cylinders and Extruder Barrels, *by R. K. West, West Instrument Corp.*

SESSION III: COMPRESSION MOLDING; *Moderator, E. F. Borro, Sr., Hooker Electrochemical Co.*

The Use of Alkyd Molding Compounds in Electrical and Electronic Applications, *by J. J. Moylan, Barrett Div., Allied Chemical & Dye Corp.* The paper discusses briefly the three basic types of alkyd molding compounds: mineral-filled granular material, mineral-filled putty materials, and glass-reinforced types. The electrical properties of these compounds are discussed and charts showing the effects of temperature and high humidity ex-



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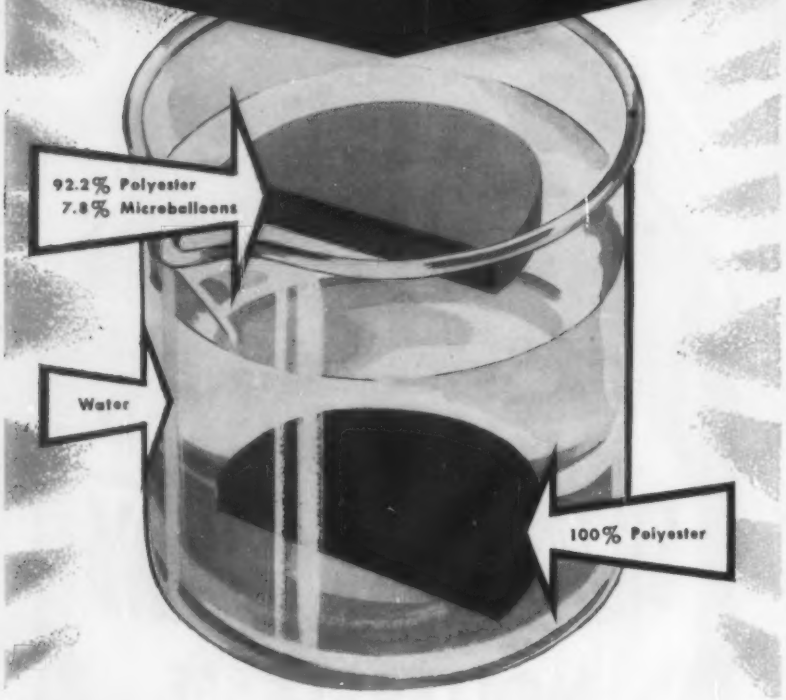
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posure are presented. Some typical applications of the three types are described.

Advanced Tooling Techniques for Molding High-Impact Thermosetting Materials, *by E. Keusch, The Fiberite Corp.* The development of mold designs for molding high-impact thermosets is outlined. Flash, full-positive, semi-positive, transfer, and plunger molds are discussed and an evaluation of the production problems inherent to each is made. New impact-resistant materials and new methods of material preparation for molding are enumerated. A new type of mold design is needed to overcome the difficulties encountered with the older designs. The new design combination of full-positive with semi-positive is illustrated and the desirable results obtained by using this design are discussed.

Synthetic Fiber Reinforcement of Thermosetting Resin Laminates, *by J. G. Green, Jr., E. I. du Pont de Nemours & Co.* Distinct property advantages have been obtained with synthetic fiber reinforcement. By comparison to other reinforced materials, laminates of Orlon acrylic fiber, Dacron polyester fiber, or nylon are characterized by resistance to abrasion, physical toughness or impact, chemical resistance, low moisture absorption, superior electrical performance, and resistance to weathering. The resistance to abrasion of Dacron and nylon are appreciably superior to other tested fibers. The moisture absorption of Dacron- and Orlon-reinforced laminates is generally less than ½%, and extended water immersion tests show little or no loss of physical and electrical properties.

A Discussion on a Fully Automatic Transfer Molding Machine, *by J. J. Hull, Hull-Standard Corp.*

SESSION IV: RESEARCH SYMPOSIUM ON THE RHEOLOGY OF PLASTICS; *Moderator, E. Haddad, Monsanto Chemical Co.*

Determination of the Flow Properties of Thermoplastic Melts—A Review of Instruments and Methods, *by J. McKelvey, J.*

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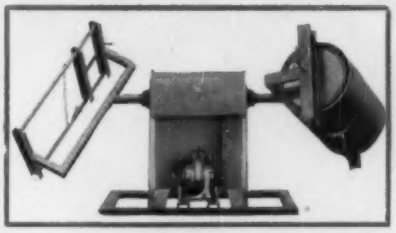
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Gavis and T. G. Smith, The Johns Hopkins University.

Heat Generation and Expansion Effects in the Rheology and Molding of Plastics, by *H. L. Toor, Carnegie Institute of Technology.*

The Photographic Study of Flow of Molten Polyethylene Into Capillaries, *by J. P. Tordella, E. I. du Pont de Nemours & Co.*

Classification and Interpretation of Flow Data, *by R. E. Colwell, Monsanto Chemical Co.*

Flow Behavior and Turbulence in Polyethylene, *by R. F. Westover, Bell Telephone Laboratories.*

Friday morning

SESSION I: POLYETHYLENE; *Moderator, J. Howard, Bell Laboratories.*

Dimensional Stability of Linear Polyethylene, *by R. W. Miller and W. C. Sager, The Dow Chemical Co.* The effects of cylinder temperature, pressure, and mold temperature are presented on such properties as tensile strength, elongation, impact strength, shrinkage, etc., of linear (high-density) polyethylene. Shrinkage appears to be most strongly affected, increasing with rising mold temperature. It ranges from 2.5 to 5%, depending on molding conditions, and poses a problem where close tolerances must be held. Best physicals are obtained when linear polyethylene is molded at low mold temperatures, high cylinder temperatures, and high molding pressures.

Linear Polyethylene as a Melt Spun Fiber, *by T. C. Broadwell, A. T. Widiger, and G. H. Youse, The Dow Chemical Co.* These fibers will probably be useful in many applications, but must be protected with anti-oxidants and UV absorbers. Indications of present evaluations are: excellent tensile and knot strengths, low shrinkage, and good flex life. Low density will lower price.

Property-Structure Relationships in Polyethylene, *by H. M. Spurlin and W. O. Bracken, Hercules Powder Co.*

A Method of Evaluation of Polyethylene Molding Compounds, *Spencer Chemical Co.*

SESSION II: REINFORCED PLASTICS (II); *Moderator, R. Sonneborn, Owens-Corning.*

Development of High Temperature Resin-Glass Systems, *by S. G. Salzinger, Coast Mfg. Co.*

Synthetic Fibers in Formable Acrylic Sheet, *by D. E. Jackson, E. I. du Pont de Nemours & Co.* Orlon-reinforced acrylic sheet has both stiffness and toughness and is highly formable, particularly with high forming pressures. Woven reinforcement gave better surfaces but no better physicals than needled batt. Dacron and nylon fibers gave much higher impact strengths than Orlon, but the sheets were not very formable by the vacuum method. The best laminates were made at temperatures up to 100° C. and pressures over 50 p.s.i.

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Plastics Film Systems, *by J. Bjorksten and R. P. Lappalo, Bjorksten Research Laboratories.*

Estimating in Reinforced Plastics, *by F. W. Sheffler, Lunn Laminates, Inc.* A good estimate must describe the product clearly and completely, give reliable price and delivery data, and provide adequate material and processing information. It should consider the start-up load—higher initial labor costs while operators are learning the job. Estimators should have engineering background, experience in reinforced plastics, familiarity with company operations, cost consciousness, and a cooperative personality.

SESSION III: EPOXIES; *Moderator, J. L. Formo, Minneapolis-Honeywell.*

Reactive Diluents in Epoxy Resin Systems, *by E. N. Dorman, Ciba Co., Inc.*

Epoxy Encapsulation of Transistor Flip-Flops, *by P. E. Ritt and R. F. Marshall, Melpar, Inc.* After considerable experimentation on this problem of conflicting requirements, the successful encapsulating program features 1) low viscosity of potting compound, 2) application of vacuum to eliminate bubbles, 3) heat curing. This system achieved a low-weight encapsulation that was rugged and resistant to vibration.

Polysulfide Liquid Polymer/Epoxy Resin Compounds in Plastic Tooling Applications, *by A. J. Breslau and E. H. Sorg, Thiokol Chemical Corp.*

Manufacturing Considerations Associated with Encapsulating, Embedment, and Potting Processes, *by C. A. Harper, Westinghouse Electric Corp.* Subjects discussed include embedment material systems and associated critical variables such as viscosity and pot life; tools and fixtures such as molds, stripping fixtures, cut-off tools, mold cleaning equipment, etc., and process equipment such as compound mixing equipment, compound-catalyst mixing equipment, and curing ovens. The relationships as they affect one another and as they affect the over-all manufacturing operation are covered.—END

(*From pp.* 149-168)

son, Ind. Eng. Chem. *47*, 2201-2205 (Oct. 1955).
154. "Second order transition temperatures of polyethylenes," by F. Danusso, G. Moraglio, and G. Talamini, J. Polymer Sci. *21*, 139-140 (July 1956).
155. "On the determination of methyl content in polyethylenes," by E. J. Slowwinski, Jr., H. Walter, and R. L. Miller, J. Polymer Sci. *19*, 353-358 (Feb. 1956).
156. "Ball-drop technique for estimating polyethylene film toughness," by R. H. Supnik and C. H. Adams, Plastics Tech. *2*, 151-157, 178 (Mar. 1956).
157. "Temperature effect in the tensile behavior of polyethylene," by M. Nakamura and S. M. Skinner, J. Polymer Sci. *18*, 423-424 (Nov. 1955).
158. "Note on the compressibility behavior of polyethylene during tensile test," by M. Nakamura and S. M. Skinner, J. Polymer Sci. *18*, 583-585 (Dec. 1955).
159. "Viscoelastic properties of crystalline polymers: Polyethylene," by E. Catsiff, J. Offenbach, and A. V. Tobolsky, J. Colloid Sci. *11*, 48-50 (Feb. 1956).
160. "Scattering of light from thin polymer films. II. Scattering from polyethylene," by Keane and Stein, J. Polymer Sci. *20*, 327-350 (May 1956).
161. "How to apply and sinter fluorocarbon coatings," by G. Bartczak, Modern Plastics *34*, 127-131, 134, 136, 138, 140, 142, 144, 149, 241-243 (Sept. 1956).
162. "Fluorocarbon dispersion coatings," by G. Bartczak, Materials and Methods *42*, 90-95 (Nov. 1955).
163. "Preparing Teflon for bonding," Plastics Tech. *2*, 458 (July 1956).
164. "Bonding qualities of Teflon improved," Materials and Methods *43*, 118-119 (Apr. 1956).
165. "Heat bonding of "Teflon" tetrafluoroethylene resin," by P. J. Wayne and W. M. Brunner, SPE J. *11*, 28-30, 42 (Dec. 1955).
166. "Fluorocarbon-bronze dry bearing material," Materials and Methods *42*, 94-95 (Sept. 1955).
167. "Small oil-free bearings," by H. S. White, J. Research NBS *57*, 185-204 (Oct. 1956).
168. "Zytel and Teflon resins as bearing materials," by A. J. Cheney, W. B. Happoldt, and K. G. Swayne, Plastics Tech. *2*, 221-225, 230 (Apr.); 314-319 (May 1956).
169. "New fiber-reinforced fluorocarbon," by N. L. Greenman, Materials and Methods *42*, 110-111 (Nov. 1955).
170. "Paste extrusion," by W. B. Thompson and R. E. Stabler, Modern Plastics *33*, 115-120, 122, 124-125 (Feb. 1956).
171. "Friction of Teflon sliding on Teflon," by D. G. Flom and N. T. Porile, J. Applied Phys. *26*, 1088-1092 (Sept. 1955).
172. "Thermal expansion of polytetrafluoroethylene (Teflon) from —190° to +300° C," by C. R. K. Kirby, J. Research NBS *57*, 91-94 (Aug. 1956).
173. "Thermal decomposition of polytetrafluoroethylene in various gaseous atmospheres," by L. A. Wall and J. D. Michaelsen, J. Research NBS *56*, 27-34 (Jan. 1956).
174. "Physical properties of "Teflon" polytetrafluoroethylene," by R. C. Doban, C. A. Sperati, and B. W. Sandt, SPE J. *11*, 17-21, 24, 30 (Nov. 1955).
175. "Effects of fabrication on the properties of Teflon resins," by P. E. Thomas, J. F. Lontz, C. A. Sperati, and J. L. McPherson, SPE J. *12*, 89-96 (June 1956).
176. "Growing field for use of PTFE," Brit. Plastics *29*, 42-45, 74 (Feb. 1956).
177. "PTFE and PTFCE," by J. Gadsby, Rubber and Plastics Age *37*, 177-180 (Mar. 1956).
178. "Copolymerization of highly fluorinated olefins with ethylene oxide," by M. Hauptschein and J. M. Lesser, J. Am. Chem. Soc. *78*, 676-679 (Feb. 5, 1956).
179. "Advances in thermoset molding," by E. F. Borro, Modern Plastics *33*, 145-146, 148, 150, 152, 154-155 (May 1956).
180. "World's largest pressure moldings," Modern Plastics *33*, 106-109 (Aug. 1956).
181. "Phenolic resin process design," by F. W. Hammesfahr, D. C. Johnson, S. N. Johnson, and S. Seltzer, Modern Plastics *33*, 139-142, 144, 149-150, 152, 248, 250 (Feb. 1956).
182. "Cross-linking of a phenol-formaldehyde novolac," by M. F. Drumm, C. W. H. Dodge, and L. E. Nielsen, Ind. Eng. Chem. *48*, 76-81 (Jan. 1956).
183. "Formaldehyde condensations with phenol and its homologues. XVII. The chemical complexity of resins," by S. H.

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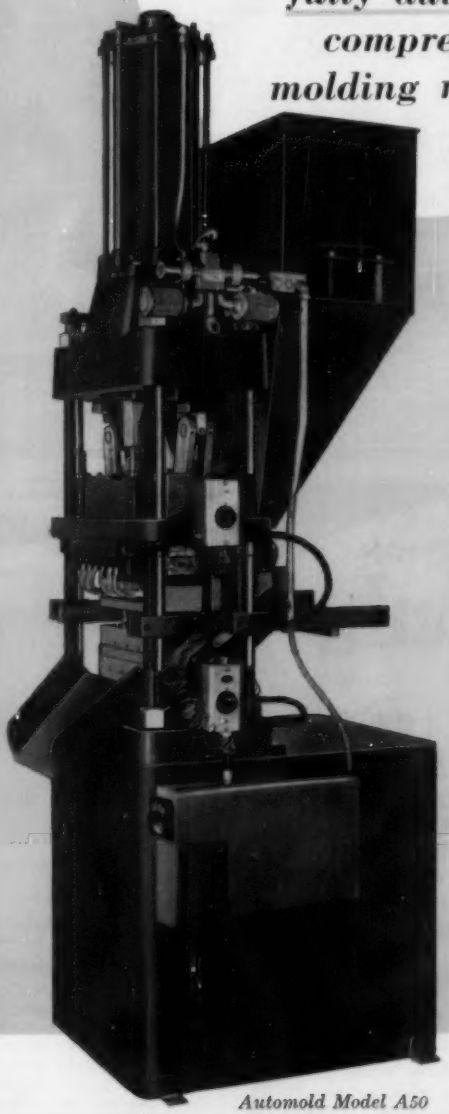
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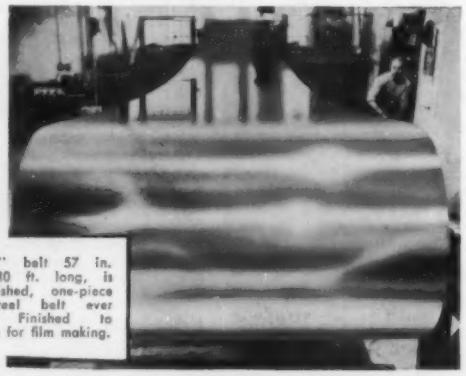
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Hollingdale and N. J. L. Megson, J. Applied Chem. 5, 616-624 (Nov. 1955).
184. "Mechanism of the alkali catalyzed phenol-formaldehyde reaction," by J. S. Fitzgerald and R. J. L. Martin, Australian J. Chem. 8, 194-214 (May 1955).
185. "Determination of methylol groups in phenolic resins," by G. A. Steinmark and F. T. Weiss, Analytical Chem. 28, 260-262 (Feb. 1956).
186. "Degree of cure in thermosetting resins," by E. Barr, Ind. Eng. Chem. 48, 71-74 (Jan. 1956).
187. "Internal pressure distribution in molding phenolic test bars," by J. M. Rausch and W. Orvis, SPE J. 12, 24-28, 58 (Jan. 1956).
188. "Phenolic resins," Canadian Plastics 1955, 40-45 (Oct.).
189. "New markets for nylon-6," by M. Stringfellow, Modern Plastics 34, 131-135, 250, 252, 254 (Nov. 1956).
190. "Large diameter nylon pipe for export," Rubber and Plastics Age 37, 376-378 (June 1956).
191. "Polyamide-11 in the electrical field," by R. Dumon, Modern Plastics 33, 151-152, 154, 156, 230 (Aug. 1956).
192. "Better 'nylon' in the making?" Chem. Week 78, 54, 56 (Mar. 31, 1956).
193. "The nylon milk bottle," Plastics (London) 21, 73 (Mar.-May 1956).
194. "Nylon drives heavy industry," Modern Plastics 34, 119 (Nov. 1956).
195. "Nylon strip in window channel, "Modern Plastics 34, 220 (Sept. 1956).
196. "Nylon bellows in explosion suppression device," Modern Plastics 33, 343 (June 1956).
197. "Effect of crystallinity on the properties of nylons," by H. W. Starkweather, Jr., G. E. Moore, J. E. Hansen, T. M. Roder, and R. E. Brooks, J. Polymer Sci. 21, 189-204 (Aug. 1956).
198. "Some isomorphous copolyamides," by F. B. Cramer and R. B. Beaman, J. Polymer Sci. 21, 237-250 (Aug. 1956).
199. "High molecular-weight nylon. I. Comparison with other polyamide materials," by W. Stiner, Plastics (London) 21, 141-142 (June). II. "Processing techniques," ibid. 174-175 (July). III. "Properties as a packaging material," ibid. 207-209 (Aug. 1956).
200. "Proton magnetic resonance in polyamides," by W. P. Slichter, J. Applied Phys. 26, 1099-1103 (Sept. 1955).
201. "Crystallinity studies of polyamides by infrared, specific volume, and X-ray studies," by I. Sandeman and A. Keller, J. Polymer Sci. 19, 401-435 (Mar. 1956).
202. "Polymer characterization: A typical copolyamide system," by R. G. Beaman and F. B. Cramer, J. Polymer Sci. 21, 223-235 (Aug. 1956).
203. "Reinforced molding compounds. Part 1. Polyesters and alkyds," Modern Plastics 33, 91-96, 194-195, 198, 201-202, 204, 206 (Aug. 1956).
204. "Glass-polyester washing machine parts," Modern Plastics 33, 187 (July 1956).
205. "Polyester casting resins for rigid insulating parts," by R. G. Black, Electrical Mfg. 56, 139-142 (Oct. 1955).
206. "Alkyd molding materials," Brit. Plastics 29, 354-357 (Oct. 1956).
207. "Progress with alkyd molding powders," Plastics (London) 21, 112-113 (June 1956).
208. "Alkyd molding materials and their applications," by J. H. Bennitt, A. L. Ashton, and D. M. Jonas, Plastics Inst. Trans. and J. 24, 213-234 (July 1956).
209. "Polyester laminating resins; part I," by J. Brydson and C. W. Welch, Plastics (London) 21, 282-285 (Oct. 1956).
210. "Storing and handling polyester resins in bulk," Plastics Tech. 2, 400-401 (June 1956).
211. "Critical temperatures of a series of peroxides in polyester resins," Brit. Plastics 29, 377-378 (Oct. 1956).
212. "Photosensitizers for polyester-vinyl polymerization," by C. M. McCloskey and J. Bond, Ind. Eng. Chem. 47, 2125-2129 (Oct. 1955).
213. "Allyl polymerization beyond the gel point," by H. W. Starkweather, Jr., and F. R. Eirich, Ind. Eng. Chem. 47, 2452-2455 (Dec. 1955).
214. "Polymerization control in casting thermosetting resin," by W. R. Dial, W. E. Bissinger, B. J. DeWitt, and F. Strain, Ind. Eng. Chem. 47, 2447-2451 (Dec. 1955).
215. "Cure of carbon black-unsaturated polyester mixtures," by C. W. Sweitzer, F. Lyon, and T. S. Grabowski, Ind. Eng. Chem. 47, 2380-2385 (Nov. 1955).
216. "Measurement of the degree of cure of polyester resins by the Wallace Micro Indentation Tester," F. N. B. Bennett and R. Hayes, Plastics (London) 20, 282-284 (Aug. 1955).
217. "Properties of styrene-polyester copolymers," by J. M. Church and C. Berenson, Ind. Eng. Chem. 47, 2456-2462 (Dec. 1955).
218. "Effect of substituents upon melting points of linear polyesters," by K. W. Doak and H. N. Campbell, J. Polymer Sci. 18, 215-226 (Oct. 1955).
219. "Raman spectra of monomeric and polymeric allyl diglycol carbonate," by M. A. Jeppesen, J. Polymer Sci. 19, 331-336 (Feb. 1956).
220. "Measurement of the molecular weight of a polyester and evaluation of its molecular volume," by H. L. Rosano, J. Colloid Sci. 10, 362-369 (Aug. 1955).
221. "Monomer reactivity ratios in a model unsaturated polyester system," by M. Gordon, B. M. Grieveson, and I. D. McMillan, J. Polymer Sci. 18, 497-514 (Dec. 1955).
222. "*cis*- and *trans*-polyester formed by condensation of geometric isomers of 2-butene-1,4-diols and ethene-1,2-dicarboxylic acids," by W. M. Smith, K. C. Eberly, E. E. Hanson, and J. L. Binder, J. Am. Chem. Soc. 78, 626-630 (Feb. 5, 1956).
223. "Emulsion polymerization of triallyl phosphate with halomethanes," by J. G. Frick, Jr., J. W. Weaver, R. L. Arceneaux, and M. F. Stansbury, J. Polymer Sci. 20, 307-315 (May 1956).
224. "Boiled in film," Modern Plastics 34, 136-137 (Oct. 1956).
225. "Polyester film pouches," Modern Packaging 29, 90-92, 199-200 (Jan. 1956).
226. "Bundling in polyester film," Modern Packaging 29, 89-91 (Apr. 1956).
227. "Mylar—a high-strength film," by D. D. Lanning, Prod. Eng. 27, 187-191 (July 1956).
228. "Better conveyor belts for foods," Modern Plastics 34, 124-125, 244, 247 (Nov. 1956).
229. "Bonding of Terylene polyester fiber to natural and synthetic polymers," by T. J. Meyrick, Rubber and Plastics Age 37, 394-395 (June 1956).
230. "Silicone alloys—new engineering materials," by C. L. Petze, Jr., Modern

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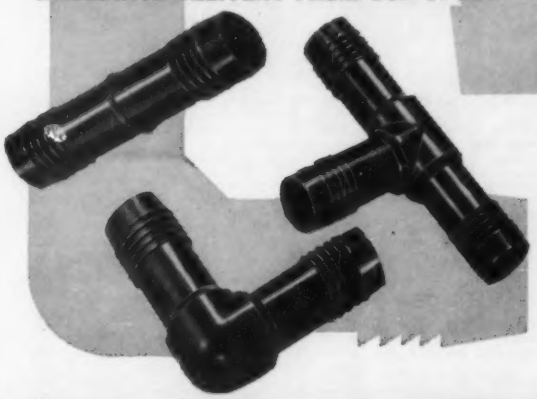
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Plastics *33*, 207-208, 210, 212, 214, 219, 223 (June 1956).

231. "Effect of glass fibers on cure of silicone resins," by H. A. Clark and K. R. Hoffman, Ind. Eng. Chem. *48*, 104-106 (Jan. 1956).

232. "Silicone-glass parts by vacuum laminating," by Hoffman and Elliot, Materials and Methods *42*, 110 (Sept. 1955).

233. "Silicones for the plastics industry," Brit. Plastics *29*, 158-161 (May 1956).

234. "Silicone rubber—properties, forming, applications," by S. K. Moxness, Prod Eng. *27*, 173-176 (Mar. 1956).

235. "Swelling of silicone elastomers," by R. L. Hauser, C. A. Walker, and F. L. Kilbourne, Jr., Ind. Eng. Chem. *48*, 1202-1208 (July 1956).

236. "Silicones step lively," Chem. Eng. News. *34*, 2798 (June 4, 1956).

237. "Copolymerization of vinyl silanes," by B. R. Thompson, J. Polymer Sci. *91*, 373-377 (Feb. 1956).

238. "The mode of peroxide-catalyzed polymerization of vinyltriethoxysilane," by R. Y. Mixer and D. L. Baley, J. Polymer Sci. *18*, 573-582 (Dec. 1955).

239. "Synthesis and polymerization of organosilanes containing vinyl and hydrogen joined to the same silicon atom," by J. W. Curry, J. Am. Chem. Soc. *78*, 1686-1689 (Apr. 20, 1956).

240. "Organopolysiloxanes containing group IV organometallic substituents in the side chains," by D. Seyferth and E. G. Rochow, J. Polymer Sci. *18*, 543-558 (Dec. 1955).

241. "An investigation of the theory of rubber elasticity using irradiated polydimethylsiloxanes," by A. M. Bueche, J. Polymer Sci. *19*, 297-306 (Feb. 1956).

242. "Determination of silicones in textile materials," by G. M. Petty, Analytical Chem. *28*, 250-251 (Feb. 1956).

243. "Trapped-sheet forming," by E. T. Aldington, P. S. Rath, and A. M. Tobia, Modern Plastics *33*, 117-120, 122, 124, 242 (Mar. 1956).

244. "Protective coatings for polystyrene," by J. A. Snyder, C. F. Martino, J. R. Wilkinson, and E. H. Wood, Modern Plastics *33*, 252, 254, 425 (June 1956).

245. "Consideration of some basic faults in polystyrene molding. I. Heat considerations," by M. Fuzzard, Brit. Plastics *29*, 176-177 (May); "II. Packing and stressing," ibid. 217-218 (June 1956).

246. "Polystyrene manufacture," Plastics (London) *21*, 261-263 (Oct. 1956).

247. "Instantaneous polymerization of styrene by trifluoroacetic acid," by J. J. Throssell, S. P. Sood, M. Szwarc, and V. Stannett, J. Am. Chem. Soc. *78*, 1122-1125 (Mar. 20, 1956).

248. "Sensitized polymerization of styrene. The rate and efficiency of initiation," by J. C. Bevington, Trans. Faraday Soc. *51*, 1392-1397 (Oct. 1955).

249. "Cationic polymerization of styrene by stannic chloride in benzene and in carbon tetrachloride solutions," by S. Okamura and T. Higashimura, J. Polymer Sci. *21*, 289-299 (Aug. 1956).

250. "Poly-α,β,β-trifluorostyrene," by D. I. Livingston, P. M. Kamath, and R. S. Corley, J. Polymer Sci. *20*, 485-590 (June 1956).

251. "Reaction of oriented polystyrene monofilaments," by R. D. Andrews, J. Applied Phys. *26*, 1061-1074 (Sept. 1955).

252. "Durability of modified polystyrene," by L. Gilman, K. T. Carolan, and M. Resnick, Modern Plastics *34*, 176, 178, 180, 185 (Sept. 1956).

253. "Reverse-printed overlays," Modern Plastics *34*, 97-101 (Sept. 1956).

254. "Kralastics," by E. J. Trunk, Product Eng. *26*, 171-173 (Nov. 1955).

255. "Improved impact polystyrenes," by S. D. Eagleton, Plastics Inst. Trans. and J. *24*, 250-266 (July 1956).

256. "Production of sheet from toughened polystyrene," by D. G. Peacock, Brit. Plastics *29*, 369-372 (Oct. 1956).

257. "Toughened polystyrenes," by V. H. Wentworth, Brit. Plastics *28*, 507-508, 518 (Dec. 1955).

258. "Compounding and processing styrene copolymer resins," by R. J. McCutcheon and K. K. Fligor, Plastics Tech. *2*, 95-100 (Feb. 1956).

259. "Butadiene-styrene copolymers for shoe soles," Brit. Plastics *29*, 387 (Oct. 1956).

260. "Luggage is going places with copolymer sheet," Modern Plastics *34*, 126-129, 248 (Nov. 1956).

261. "Styrene cases for better batteries," Modern Plastics *33*, 186-187, 414, 416 (June 1956).

262. "Revere sticks to plastics," Modern Plastics *33*, 95-98, 221, 224 (Mar. 1956).

263. "Portable coin sorter," Modern Plastics *33*, 183-185, 410 (June 1956).

264. "Plastisol coatings," Canadian Plastics *1956*, 27-29 (May).

265. "Vinyl laminate," by C. F. Kiernan and A. J. Lombardi, Product Eng. *27*, 167-170 (July 1956).

266. "The economic stabilization of vinyl chloride polymer," by H. V. Smith, Brit. Plastics *29*, 373-376 (Oct. 1956).

267. "Industrial applications for dispersions of vinyl resins," by R. L. Norum, SPE J. *12*, 21-23 (Jan. 1956).

268. "PVC extrusion compounds," by H. D. Brett, Plastics (London) *21*, 15-17 (Jan. 1956).

269. "Elastomeric injection molding compounds from vinyl resins," by T. C. Yound, Brit. Plastics *28*, 378-382 (Sept. 1955).

270. "For better vinyls," Chem. Eng. News *34*, 2800, 2802 (June 4, 1956).

271. "Roll bending," by M. Jukich, Modern Plastics *33*, 138, 140, 145-146, 148 (Apr. 1956).

272. "Development of rigid vinyl sheet production," by F. B. Makin, Brit. Plastics *28*, 500-504 (Dec. 1955).

273. "Fabrication and uses of rigid vinyl sheet," by W. E. Martin, Brit. Plastics *28*, 328-334, 345 (Aug. 1955).

274. "Causes of fish-eyes in vinyl articles," by M. R. Rector, Plastics Tech. *2*, 390-393 (June 1956).

275. "Injection molding of vinyl chloride dry blends," by C. W. Bulkley, SPE J. *12*, 14-16, 52 (Feb. 1956).

276. "Vinyl calendering and plastisol technology," by G. T. Barks and M. W. Williams, Plastics Tech. *1*, 480-485, 499 (Sept. 1955).

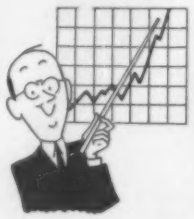
277. "Plastisol viscosity—temperature characteristics," by W. D. Todd, D. Esarove, and W. M. Smith, Modern Plastics *34*, 159-160, 162-164, 166, 168, 170, 172, 174, 249 (Sept. 1956).

278. "Fire-resistant properties of PVC and related polymers," by S. J. Skinner and S. E. Bolam, Rubber and Plastics Age *37*, 169-172 (Mar. 1956).

279. "Specific heat of synthetic high polymers. VI. A study of the glass transition in polyvinyl chloride," by S. Al-

ford and M. Dole, J. Am. Chem. Soc. 77, 4774-4777 (Sept. 20, 1955).
280. "Base accelerated degradation of polyvinyl chloride," by J. E. Campbell and W. H. Rauscher, J. Polymer Sci. *18*, 461-478 (Dec. 1955).
281. "Improved ester-plasticized polyvinyl chlorides," by W. F. Fischer and B. M. Vanderbilt, Modern Plastics *33*, 164, 166, 168, 170, 172 (May 1956).
282. "Plasticizers for PVC. I. Types in current use," by I. Phillips and P. G. Youde, Brit. Plastics *29*, 337-342; "II. Future developments," by E. Chadwick, ibid. 342-343 (Sept. 1956).
283. "Stabilizers for vinyl chloride and its copolymers," by M. Perry and P. F. Bruins, Plastics Tech. *1*, 609-613 (Nov.); 684 (Dec. 1955).
284. "Rapid screening of plastisol viscosity depressants," by T. G. Patton and F. M. Hall, Plastics Tech, *2*, 22-23, 34 (Jan. 1956).
285. "Precipitated calcium carbonate as a filler for PVC," by H. M. Macturk and I. Phillips, Brit. Plastics *28*, 463-467 (Nov. 1955).
286. "Showerbaths for warships," by M. Malamut, W. R. Graner, and J. J. Kearns, Modern Plastics *34*, 129-132 (Oct. 1956).
287. "Portable ditch," Modern Plastics *34*, 110-112 (Nov. 1956).
288. "Vinyl cast on paper carrier," Modern Plastics *34*, 126-127 (Dec. 1956).
289. "Vinyl lining presents water seepage," Modern Plastics *33*, 180 (July 1956).
290. "Chrome protected by vinyl spray," by H. Chase, Modern Plastics *34*, 147 (Oct. 1956).
291. "The production of PVC-backed carpets," Brit. Plastics *29*, 381 (Oct. 1956).
292. "Window shades in vinyl," Modern Packaging *29*, 99, 220 (Apr. 1956).
293. "Polyvinyl chloride for molded parts," by C. W. Buckley, Electrical Mfg. *56*, 106-112 (Nov. 1955).
294. "Vacuum formed PVC saddle cover," Brit. Plastics *29*, 358 (Oct. 1956).
295. "Vinyl epoxystearate: preparation, polymerization, and properties of polymers and copolymers," by L. S. Silbert, Z. B. Jacobs, W. E. Palm, L. P. Witnauer, W. S. Port, and D. Swern, J. Polymer Sci *21*, 161-173 (Aug. 1956).
296. "Vinyl esters of perfluoro acids," by T. S. Reid, D. W. Codding, and F. A. Bovey, J. Polymer Sci. *18*, 417-421 (Nov. 1955).
297. "Mechanism of chain initiation and chain transfer in the polymerization of vinylpyridine," by R. L. Dannley, J. A. Schufle, I. Cohen, and J. R. Chambers, J. Polymer Sci. *19*, 285-296 (Feb. 1956).
298. "Light scattering and viscosity studies of polyvinyl acetate solutions," by V. V. Varadaiah, J. Polymer Sci. *19*, 477-484 (Mar. 1956).
299. "Behind Goodrich's synthetic fiber; the new technology of vinylidene cyanide," Chem. Week 77, 81-82, 84 (Nov. 12, 1955).
300. "New British standard for PVC sheet," Brit. Plastics *29*, 380 (Oct. 1956).
301. "Reaction of cellulose with dimethylol and monomethylolureas," by R. Steele and L. E. Giddings, Jr., Ind. Eng. Chem. *48*, 110-114 (Jan. 1956).
302. "Catalysis of urea-formaldehyde condensation," by I. J. Gruntfest and E. M. Yound, Jr., Ind. Eng. Chem. *48*, 107-109 (Jan. 1956).
303. "Infra-red analysis of paint vehicles based on alkyd-nitrogen resin blends," by C. D. Miller and O. D. Shreve, Analytical Chem. *28*, 200-201 (Feb. 1956).
304. "Reaction and cure in melamine plastics," by H. P. Wohnsiedler, I. H. Updegraff, and R. H. Hunt, Jr., Ind. Eng Chem. *48*, 82-85 (Jan. 1956).
305. "Ion exchange in the atomic energy program," by R. Kunin and A. F. Preuss, Ind. Eng. Chem. *48*, 30A-35A (Aug. 1956).
306. "Compounding acrylate polymers for resistance to a diester lubricant," by W. J. Mueller and R. A. Clark, Ind. Eng. Chem. *48*, 982-991 (June 1956).
307. "Rubber-modified alkyd sealers for castings," Materials and Methods *43*, 130-131 (Apr. 1956).
308. "Dilaminar elastomeric films," by M. G. Defries, L. Schneider, P. Fram, and F. Leonard, J. Polymer Sci. *20*, 267-286 (May 1956)
309. "The melting behavior of polybutadiene," by L. Mandelkern, M. Tryon, and F. A. Quinn, Jr., J. Polymer Sci. *19*, 77-86 (Jan. 1956).
310. Infra-red studies on chlorinated rubbers," by C. S. Ramakrishnan, S. Dasgupta, and J. B. Pande, J. Polymer Sci. *19*, 323-330 (Feb. 1956).
311. "Thermodynamics of crystallization in high polymers: Gutta percha," by L. Mandelkern, F. A. Quinn, and D. E. Roberts, J. Am. Chem. Soc. *78*, 926-932 (Mar. 5, 1956).
312. "Influence of exposure conditions on the accelerated durability testing of asphalt," by L. R. Kleinschmidt and S. H. Greenfeld, ASTM Bulletin No. 213, 69-73 (Apr. 1956).
313. "Time and temperature effects on the deformation of asphaltic bitumens and bitumen-mineral mixtures," by C. Van der Poel, SPE J. *11*, 47-53 (Sept. 1955).
314. "Manufacturing operations," by J. L. Amos and A. F. Roche, Ind. Eng. Chem. *47*, 2441-2444 (Dec. 1955).
315. "Glass polymerization vessel for small scale studies," by J. D. Sutherland and J. P. McKenzie, Ind. Eng. Chem. *48*, 17-19 (Jan. 1956).
316. "Solid state polymerization initiated by high-energy electrons," by Lawton, Grubb, and Balwit, J. Polymer Sci. *19*, 455-458 (Mar. 1956).
317. "Some experiments on sulfur as inhibitor for the polymerization of styrene," by Bartlett and Trifan, J. Polymer Sci. *20*, 457-476 (June 1956).
318. "Diffusion control in the polymerizations of methyl methacrylates and styrene," by E. R. Robertson, Trans. Faraday Soc. *52*, 426-437 (Mar. 1956).
319. "Heterogeneous catalysis," by M. Boudart and T. Kwan, Ind. Eng. Chem. *48*, 562-569 (Mar. 1956).
320. "Glycidyl ether reactions with alcohols, phenols, carboxylic acids, and acid anhydrides," by L. Shechter and J. Wynstra, Ind. Eng. Chem. *48*, 86-93 (Jan. 1956).
321. "Glycidyl ether reactions with amines," by L. Shechter, J. Wynstra, and R. P. Kurkjy, Ind. Eng. Chem. *48*, 94-97 (Jan. 1956).
322. "Incorporation of aroyloxy radicals in polymer molecules," by R. L. Dannley and E. L. Kay, J. Polymer Sci. *19*, 87-92 (Jan. 1956).
323. "Aromatics in fibers and films," by G. P. Hoff and J. L. Martin, Ind. Eng. Chem. 47, 2122-2125 (Oct. 1955).
324. "Characterization of graft poly-

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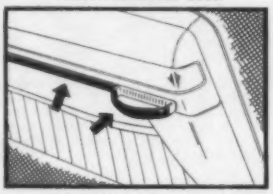
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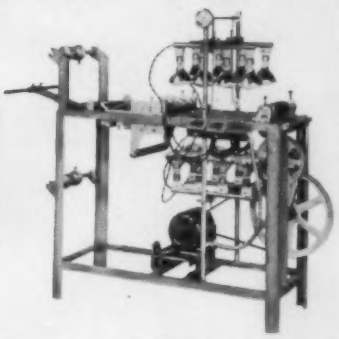


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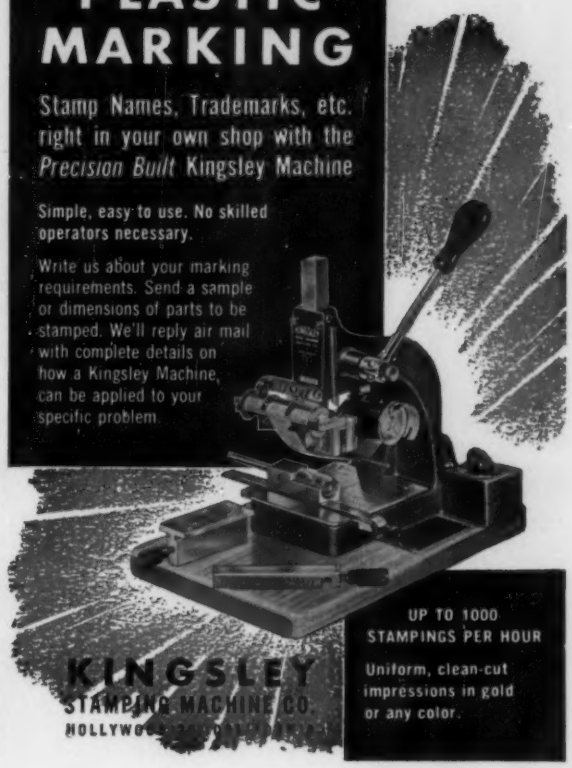
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mers," by J. A. Blanchette, and L. B. Nielsen, J. Polymer Sci. *20*, 317-326 (May 1956).

325. "Intermediate for flame-resistant polymers," by W. A. Reeves and J. D. Guthrie, Ind. Eng. Chem. *48*, 64-67 (Jan. 1956).

326. "From jeeps to giants," Modern Plastics *34*, 103-109, 220-221, 224, 226 (Nov. 1956).

327. "New press, new process for big reinforced plastics pieces," Modern Plastics *34*, 106-109, 228 (Sept. 1956).

328. "No aid to enemy," Modern Plastics *33*, 96-99, 239-240 (Feb. 1956).

329. "Reinforced plastics springs," by F. W. Reinhart and S. B. Newman, SPE J. *12*, 11-14, 50 (Aug. 1956).

330. "Plastics springs," by F. W. Reinhart and S. B. Newman, Product Eng. *27*, 183-186 (June 1956).

331. "Investigation of plastics for toilet bowls," by S. B. Swenson and H. Graus, Modern Plastics *34*, 164 (December 1956).

332. "Reinforced plastics school desks," Modern Plastics *33*, 228 (Apr. 1956).

333. "Big boat—no mold," Modern Plastics *33*, 104-107 (Mar. 1956).

334. "Glass/polyester sports car body," Brit. Plastics *29*, 359 (Oct. 1956).

335. "Miniature car made of reinforced plastics," Modern Plastics *33*, 222 (May 1956).

336. "Techniques for using polytrifluorochloroethylene plastic in the chemistry laboratory," by M. E. Runner and G. Baloq, Analytical Chem. *28*, 1180-1182 (July 1956).

337. "Flexible/rigid laminates in chemical plant," Brit. Plastics *29*, 52-53 (Feb. 1956).

338. "Copper-clad phenolic/paper laminates for printed circuits," Brit. Plastics *29*, 14-17 (Jan. 1956).

339. "Printed circuit parts kit," Modern Plastics *34*, 214 (Nov. 1956).

340. "Cutting costs on a cover," Modern Plastics *33*, 195, 422 (June 1956).

341. "Glass polyester reinforced concrete pipe," Brit. Plastics *29*, 298-302 (Aug. 1956).

342. "Cold beer for equatorial Africa," Plastics (London) *21*, 78-79 (Mar.-May 1956).

343. "Phenolic/paper and silicone/glass laminate in R. F. heating equipment," Brit. Plastics *29*, 368 (Oct. 1956).

344. "Universal glass finish for reinforced plastics," by E. L. Strauss, Materials and Methods *43*, 106-107 (Jan. 1956).

345. "Resins for reinforced plastics," by E. Schlieben, Product Eng. *27*, 198-203 (May 1956).

346. "Premix plastic moldings for low cost parts," by J. B. Campbell, Materials and Methods *42*, 104-107 (Sept. 1955).

347. "Toughening up reinforced resins," Chem. Eng. News *34*, 2586 (May 21, 1956).

348. "Fillers and pigments for polyesters," Canadian Plastics *1955*, 46-47, 55, 57, 59 (Aug.).

349. "Reinforced plastics from cellulose fibers," Plastics (London) *20*, 336-337 (Oct. 1955).

350. "Asbestos reinforcements," by D. V. Rosato, Modern Plastics *33*, 140, 142, 144, 146, 148, 202 (July 1956).

351. "Asbestos reinforcement for plastics laminates," by D. V. Rosato, SPE J. *12*, 24-27, 51 (Aug. 1956).

352. "Asbestos-reinforced low-pressure laminates," by J. B. Campbell, Materials and Methods *43*, 103-107 (Feb. 1956).

353. "Polyester laminates—fire-resistant electrical grade," by J. K. Allen, SPE J. *12*, 30-31, 117 (June 1956).

354. "A radically new press and mold for mass production of large plastics shapes," by C. H. Van Hartesveldt, SPE J. *12*, 24-26 (July 1956).

355. "Diamond-metal bonded tools cut hard reinforced plastics," Plastics Tech. *1*, 556-557 (Oct. 1955).

356. "The manufacture of laminated plastics by automatic control," by W. A. Goldstein, Plastics (London) *21*, 221-223 (Sept. 1956).

357. "Continuous resin injection for glass fiber molding," by J. Rees, Brit. Plastics *29*, 294-296 (Aug. 1956).

358. "Shock-curing of some laminated materials," by C. A. Redfarn and J. Bedford, Brit. Plastics *29*, 171-175 (May 1956).

359. "Glass-reinforced plastics inspection techniques found," Industrial Labs. *7*, 14 (Apr. 1956).

360. "Consistency in glass-reinforced moldings," Brit. Plastics *28*, 480-483 (Dec. 1955).

361. "Designing for reinforced plastics," by H. L. Darby, Plastics Tech. *1*, 422-425 (Aug. 1955).

362. "Determination of resin content of glass fiber-polyester laminates containing calcium carbonate filler," by S. D. Toner, Analytical Chem. *28*, 1109-1112 (July 1956).

363. "Mass production for reinforced plastics," Modern Plastics *34*, 222 (Dec. 1956).

364. "Prestressed reinforced plastics," by S. Goldfein, Modern Plastics *33*, 151-152, 154, 156, 158-159, 162-165, 265, 268 (Apr. 1956).

365. "The mechanics of plastics reinforcement in tension," by J. A. Outwater, Jr., Modern Plastics *33*, 156, 158, 160, 162, 245, 248 (Mar.); "Concentration of shear at the bonded edge of a fiber under tension," ibid. 216 (Apr. 1956).

366. "Dielectric breakdown properties of thermosetting laminates," by Skow, Trans. ASME *77*, 701 (July 1955).

367. "Thermal properties of laminates," by F. R. O'Brien, S. Oglesby, Jr., and P. C. Covington, Modern Plastics *33*, 158-159, 162, 164, 232 (Aug. 1956).

368. "Future foam-up," Chem. Week *78*, 62, 64-66 (Mar. 10, 1956).

369. "Plastic foams—their relationship and competitive picture," by J. J. Hirsh, Plastics Tech. *2*, 377-389 (June 1956).

370. "From jets to jewels," by B. L. Raskin, Chem. Eng. News *34*, 2492-2498 (May 21, 1956).

371. "Many plastics foams under development," Brit. Plastics *29*, 118-122 (Apr. 1956).

372. "Manufacture of polyurethane foams," Canadian Plastics *1955*, 44, 46, 48, 50, 52, 54 (Dec.).

373. "Vinyl foams made by atmospheric-pressure method," Plastics Tech. *2*, 246-247 (Apr. 1956).

374. "Vinyl foam," by H. E. Allen, Plastics Tech. *2*, 306-311 (May 1956).

375. "Cellular PVC," by S. E. Bolam and M. S. Welling, Rubber and Plastics Age, *37*, 379, 381 (June 1956).

376. "PVC pastes—theory and practice. I. Paste formulation," by M. S. Welling, Plastics (London) *21*, 121-124 (June); II. Coating, embossing, open-cell foaming," ibid. 161-163 (July); III. Closed-cell



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377. "Designing with vinyl foam," by R. Wistozky, Plastics Tech. *2*, 443-447 (July 1956).

378. "Continuous production of vinyl foam," Brit. Plastics *29*, 86-88 (Mar. 1956).

379. 'Styrene foam float and life preserver ring," Modern Plastics *33*, 219 (Apr. 1956).

380. "Laminated polystyrene foam for refrigerator construction," Brit. Plastics *29*, 366-367 (Oct. 1956).

381. "Foam in a hi-fi speaker," Modern Plastics *34*, 122-123 (Sept. 1956).

382. "Fabrication methods for expendable polystyrene," by G. E. Franson, Plastics Tech. *2*, 452-456 (July 1956).

383. "Foamed in the mold," Modern Packaging *29*, 116-117, 224, 226 (Sept. 1955).

384. "Market view of vinyl foam," Modern Plastics *33*, 113-116, 227-228, 230, 232 (May 1956).

385. "Mechanical action of flexible foams," by R. H. Carey and E. A. Rogers, Modern Plastics *33*, 139-140, 142, 144, 146, 226, 229 (Aug. 1956).

386. "First all-plastic refrigerator," Modern Plastics *34*, 114-118 (Nov. 1956).

387. "Sandwich panel," Modern Plastics *33*, 352 (June 1956).

388. "Balsa core for reinforced plastics structures," by R. Mark, Modern Plastics *33*, 131-132, 134, 136, 141-142, 144, 238, 240, 243-245 (May 1956).

389. "What's new in reinforcements," Modern Plastics *33*, 81-86, 210, 212, 214, 216, 218, 220, 222, 224 (Feb. 1956).

390. "Fibers help phenolics, melamines, and silicones to move into bigger fields," Modern Plastics *34*, 155-159, 274-276 (Oct. 1956).

391. "Fillers and reinforcements for molded plastics," by G. Lubin, Product Eng. *26*, 178-182 (Dec. 1955).

392. "Plastics-paper combinations," by E. C. Jahn and V. T. Stannett, SPE J. *12*, 32-34, 56 (Jan. 1956).

393. "Plastics aid residual products conversion," by T. A. Dickinson, Plastics (London) *20*, 414-415 (Dec. 1955).

394. "Surfactant-treated minerals as reinforcing fillers," by A. S. Michaels, Industrial Engineering Chemistry *48*, 297-304 (Feb. 1956).

395. "Pure colors for plastics," Canadian Plastics *1956*, 26-28 (Jan).

396. "Volatility of vinyl plasticizers," by W. J. Frissell, Ind. Eng. Chem. *48*, 1096-1099 (June 1956).

397. "Aryl phosphate plasticizers in modern plastics processing," Plastics (London) *21*, 289-290 (Oct. 1956).

398. "New method for determining phthalate esters in propellants," by J. Grodzinski, Analytical Chem. *27*, 1765-1767 (Nov. 1955).

399. "Glass transitions in polymer-plasticizer systems," by L. Breitman, J. Applied Phys. *26*, 1092-1098 (Sept. 1955).

400. "Food film fortifiers," Chem. Week *78*, 106, 108, 110 (Feb. 18, 1956).

401. "Electrostatic charges in plastics," by S. M. Skinner, J. Gaynor, and G. W. Sohl, Modern Plastics *33*, 127-130, 132-134, 136, 246 (Feb. 1956).

402. "Problems of electrostatic charges in plastics," Brit. Plastics *28*, 335-337 (Aug. 1955).

403. "Electrostatic charges on polyvinyl chloride," by B. D. Sully, Brit. Plastics *29*, 103-107 (Mar. 1956).

Processing

404. "Modern methods of mold making. I. Hobbing; electroforming; spark erosion," Brit. Plastics *29*, 56-60 (Feb.); "II. Copy milling and turning," ibid. 90-95 (Mar.); "III. Castings: Master patterns and finishing work," ibid. 138-142, 152 (Apr.); "IV. Materials, heat-treatment, and vapor blasting," ibid. 178-182 (May 1956).

405. "Progress in the spark machining of dies," Brit. Plastics *29*, 332-336 (Sept. 1956).

406. "Mold making by electroforming," by S. Fialkoff, Plastics Tech. *1*, 542-544 (Oct. 1955).

407. "Prehardened mold steels for the plastics industry," by B. L. Johnson, SPE J. *12*, 37-38, 54-55, 58 (Jan. 1956).

408. "Production and application of hard nickel electroformed molds and dies," by P. Spiro, Plastics Inst. Trans. and J. *24*, 267-277 (July 1956).

409. "Beryllium copper molds," Brit. Plastics *29*, 254-258 (July 1956).

410. "Mold design for effective temperature control," by C. H. Whitlock, SPE J. *11*, 25-27 (Dec. 1955).

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413. "The cause and cure of unrealistic quotes on plastic parts," Modern Plastics *33*, 81-84, 195-196 (July 1956).

414. "Polyliner improves injection molding," by E. C. Bernhardt and L. Paggi, Modern Plastics *33*, 109-112, 114, 243 (Feb. 1956).

415. "The Maccaferri injection molding heating chamber," by Maccaferri and McKee, Jr., SPE J. *12*, 11-13 (Feb. 1956).

416. "Hydraulics in the construction of injection molding machines," by A. Blumer, Brit. Plastics *29*, 108-110 (Mar. 1956).

417. "A report on weigh feeding," Modern Plastics *33*, 141 (Mar. 1956).

418. "Influence of flow orientation and injection temperature on the strength of injection moldings," by R. A. Horsley and D. J. A. Lee, Brit. Plastics *29*, 134-137 (Apr. 1956).

419. "A new measure of plastic moldability," by D. B. Semeyn, SPE J. *12*, 15-17 (May 1956).

420. "Injection molding research—today and tomorrow," by J. Eveland, H. J. Karam ,and C. E. Beyer, SPE J. *12*, 30-35 (May 1956).

421. "Simplified drive for injection machines," by I. Thomas, Modern Plastics *33*, 118-120, 125 (July 1956).

422. "Automation in injection molding," by L. Griffiths, Plastics (London) *21*, 232 (Sept. 1956).

423. "Some developments in the molding of pen barrels," Brit. Plastics *29*, 364-365 (Oct. 1956).

424. "Runner and gate design," Modern Plastics *34*, 166-167, 170, 172, 292-293 (Oct. 1956).

425. "Preplasticators pay off on small shots, too," by H. H. Schwartz, Modern Plastics *34*, 143, 146, 148 (Nov. 1956).

426. "Thermoplastic sheet production," Plastics (London) *20*, 309-313 (Sept. 1955).

427. "Fully automatic molding," by Q. M. White, Plastics Tech. *1*, 545-550 (Oct. 1955).

428. "Automatic molding of coil forms," Modern Plastics *33*, 138, 140 (Mar. 1956).

429. "Two process-controlled compression presses," Plastics (London) *21*, 278-280 (Oct. 1956).

430. "Viscous heat effects in extrusion of molten plastics," by R. B. Bird, SPE J. *11*, 35-40, 53 (Sept. 1955).

431. "Stock thermocouples, pressure gages, and rupture disks for use on plastics extruders," by E. C. Bernhardt, SPE J. *11*, 25-28 (Nov. 1955).

432. "Melt fracture-extrudate roughness in plastics extrusion," by J. P. Tordella, SPE J. *12*, 36-40 (Feb. 1956).

433. "Fracture in the extrusion of amorphous polymers through capillaries," by J. P. Tordella, J. Applied Phys. *27*, 454-458 (May 1956).

434. "Continuous 'imposed order' mixer-extruder with complementary adjustability," by M. S. Frenkel, Brit. Plastics *29*, 62-66, 75 (Feb.); 98-102, 115 (Mar. 1956).

435. "Single-screw extruders," by E. G. Fisher, Plastics Inst. Trans. and J. *24*, 125-133 (Apr. 1956).

436. "Modern views on extrusion machinery," by E. G. Fisher, Plastics Inst. Trans. and J. *24*, 143-152 (Apr. 1956).

437. "Solids conveying in extruders," by W. H. Darnell and E. A. J. Mol, SPE J. *12*, 20-29 (Apr. 1956).

438. "Stepless and 3-position temperature controls for extrusion equipment," by R. K. West, SPE J. *12*, 81-82, 116 (June 1956).

439. "High-speed extruders for cable covering," Brit. Plastics *29*, 310-311 (Aug. 1956).

440. "Design and operation of crosshead sheeting dies," Modern Plastics *33*, 127-128, 130, 132, 134, 136 (Aug. 1956).

441. "The significance of convergence-divergence in extruders and mixers," by M. S. Frenkel, Brit. Plastics *29*, 312-322 (Aug. 1956).

442. "Three position and stepless controls for extruder," by J. A. Hartnett, Plastics (London) *21*, 234-235 (Sept. 1956).

443. "Vacuum forming," Brit. Plastics *28*, 358-372 (Sept. 1955).

444. "Vacuum forming and injection molding. I." Plastics (London) *21*, 47-51 (Feb.); "II. Future trends and their effects on price," ibid, *80* (Mar.-May 1956).

445. "Production of rigid thermoplastic sheet," by E. C. Brown, Jr., Plastics Tech. *2*, 226-230 (Apr. 1956).

446. "Forming of rigid thermoplastic sheet," by R. C. Davenport, Plastics Tech. *2*, 232-236 (Apr. 1956).

447. "Planetary trimming of vacuum-formed moldings," by P. A. Sauter, Brit. Plastics *29*, 125-127 (Apr. 1956).

448. "Plug-assist forming," by J. W. Mighton, SPE J. *12*, 83-86 116 (June 1956).

449. "Modified vacuum forming technique," Brit. Plastics *29*, 252 (July 1956); Plastics (London) *21*, 158 (July 1956).

450. "Automatic sheet forming," by D. A. Davis, Modern Plastics *33*, 119-121, 124, 126 (Aug. 1956).

451. "Calculation of roll separating forces in the calendering and milling of plastics," by F. D. Dexter and D. I. Marshall, SPE J. *12*, 17-19, (Apr. 1956).

452. "Calendering equipment for plastics," by R. C. Seanor, Plastics Tech. *2*, 448-451 (July 1956).

453. "Casting plastics sheets," by J. O. Beattie, Modern Plastics *33*, 109-111, 114-117 (July 1956).

454. "Polishing plates for sheet plastics materials," Plastics (London) *21*, 281 (Oct. 1956).

455. "Automation and the plastics industry," by J. A. Sargrove, Plastics (London) *21*, 225-227 (Sept. 1956).

456. "Continuous mixing and compounding of plastics," by Marsh, Plastics (London) *21*, 236 (Sept. 1956).

457. "Electronic instruments in the plastics industry," by O. Heggs and J. Wyatt, Plastics (London) *21*, 218-220 (Sept. 1956).

458. "Use of photo-electronic equipment in the plastics industry," by L. Walter, Brit. Plastics *29*, 143-145, 156 (Apr. 1956).

459. "Mains frequency electrical induction heating for the plastics industry. Part 1. General principles, application to compression molding techniques," by W. E. Lorton and M. A. Craske, Plastics (London) *21*, 172-173 (July); "Part 2. Injection molding, extrusion," ibid. 204-206 (Aug. 1956).

460. "Drying and heating by high-velocity air," Plastics (London) *20*, 418-421 (Dec. 1955).

461. "Cast-in heaters," by W. H. Norton, SPE J. *12*, 28-29 (June 1956).

462. "Economical annealing oven," Modern Plastics *34*, 166 (Dec. 1956).

463. "Flexible heat," Modern Plastics *34*, 174 (Oct. 1956).

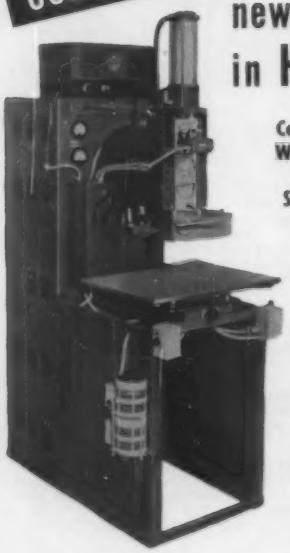
464. "Precision finishing by tumbling," by W. E. Brandt, Modern Plastics *34*, 150-152, 154, 156 (Sept. 1956).
465. "Barrel finishing plastics moldings," by E. C. Emslie, Brit. Plastics *29*, 22-25 (Jan. 1956).
466. "Decorated molded plastics," by L. E. Parks, Plastics Tech. *1*, 620-624 (Nov. 1955).
467. "Dry offset process for decorating molded plastics," by C. R. Johnson, Plastics Technology *1*, 486-489 (September 1955).
468. "Surface treatment of moldings; Part I. Painting and lacquering," by M. Fuzzard, Brit. Plastics *28*, 413-415, 437 (Oct.); Part II. Hot-stamping, printing, and electrodeposition, ibid. 452-454 (Nov. 1955).
469. "Painting and metallizing of plastics," by L. E. Parks, SPE J. *12*, 17-19 (Feb. 1956).
470. "Metallized plastic films," by T. Hammer, Product Eng. *26*, 182-185 (Aug. 1955).
471. "Design of vacuum evaporating plant for metallizing plastics," by L. Holland, Plastics Inst. Trans. and J. *24*, 153-169 (Apr. 1956).
472. "Welding and powder spraying of plastics," by J. A. Neumann, Plastics Technology *1*, 475-477, 498 (September 1955).
473. "High polymers; Process and engineering aspects," Ind. Eng. Chem. *47*, 2440-2466 (Dec. 1955).
474. "Ultrasonic inspection by pulsed transmission," by R. E. Seaman, Brit. Plastics *29*, 262-264 (July 1956).

Applications

475. "Research progress in dielectrics—1956," by A. E. Javitz, Electrical Mfg. *58*, 94-103 (Nov. 1956).
476. "New plastics molding materials," by A. E. Javitz, Electrical Mfg. *57*, 90-101 (Mar. 1956).
477. "Six billion feet in 1955," Modern Plastics *33*, 85-89 (July 1956).
478. "Potting and encapsulation," by F. G. Firth, Modern Plastics *33*, 125-127, 130, 132, 134, 136-137, 244, 246, 251, 253, 255-256, 262-263 (Apr. 1956).
479. "Casting resins insulate and protect electronic components," by H. L. Loucks, Materials and Methods *43*, 90-94 (Feb. 1956).
480. "Automatic machine for cast-resin applications," by J. E. Sensi and P. J. Franklin, Electrical Mfg. *56*, 166-169 (Sept. 1955).
481. "Protective potting of glass vacuum tubes and ceramic capacitors," by A. Benderly, J. W. Tidler, and B. Greene, SPE J. *12*, 30-33, 52 (Aug. 1956).
482. "Plastic-bound magnets," by G. Hennig, Product Eng. *27*, 182-188 (Apr. 1956).
483. "Flexible ferromagnetic plastics materials," by W. J. Davis, Electrical Mfg. *57*, 131-133 (Mar. 1956).
484. "Automotive plastics: 1956," Modern Plastics *33*, 89-94, 211-212, 214, 218-220 (Mar.); 114-118, 236, 239-240, 242 (Apr. 1956).
485. "Blown acrylic for air ducts," Modern Plastics *33*, 104-105 (Aug. 1956).
486. "Plastics in aircraft primary structures," by R. Cutler, Plastics Tech. *2*, 29-34 (Jan. 1956).
487. "High-quality plastics components for guided missile and airborne radar systems," by W. Crofut and L. B. Keller, Plastics Tech. *2*, 237-245 (Apr. 1956).
488. "Compression and transfer molding of guided missile parts," by L. B. Keller and W. McGlone, SPE J. *12*, 32-39 (Apr. 1956).
489. "Reinforced plastics in the construction of external pressure vessels," by F. R. Barnet and C. L. Lloyd, SPE J. *12*, 15-19, 38 (Aug. 1956).
490. "Farnborough 1956," Plastics (London) *21*, 270-271 (Oct. 1956).
491. "Some problems affecting the use of plastics in high speed aircraft," by M. G. Church, Plastics Inst. Trans. and J. *24*, 235-249 (July 1956).
492. "Plastics for missiles," by A. J. Zaehringer, Modern Plastics *34*, 148-151, 284 (Oct. 1956).
493. "Recent developments and current problems in plastic tooling," by B. Sokol, Plastics Tech. *2*, 394-399, 402 (June 1956).
494. "Cast plastic tooling in aircraft applications," by L. E. Frost, Plastics Tech. *1*, 614-617 (Nov. 1955).
495. "Reinforced laminates in aircraft tooling," by R. Morowicz, Plastics Tech. *1*, 493-498 (Sept. 1955).
496. "Are tool plastic standards needed?" by G. Adams, Plastics Tech. *1*, 552-555 (Oct. 1955).
497. "'All-plastics' interior," Modern Plastics *34*, 110-111, 230-231 (Sept. 1956).
498. "National boat show," Plastics (London) *21*, 37-38 (Feb. 1956).
499. "Plastics at Packaging Show," Modern Plastics *33*, 428-429 (June 1956).
500. "Heat-processible food films," by A. I. Nelson, K. H. Hu, and M. P. Steinberg, Modern Packaging *29*, 173-179, 248, 250-251 (June 1956).
501. "The first all-plastic aerosol," Modern Packaging *29*, 98-101, 207 (Nov. 1955).
502. "Extrusion and packaging," Canadian Plastics *1955*, 46-47, 49 (Nov.).
503. "Closures: Plastic or metal?" Chem. Eng. News *34*, 1126, 1128 (Mar. 5, 1956).
504. "Flexible packaging parade," Chem. Week *78*, 90, 92, 94, 96, 100, 102, 104 (June 30, 1956).
505. "Plastics films for packaging," Canadian Plastics *1956*, 44-46 (Jan.).
506. "Slip ratings for films," by W. Egan, Modern Packaging *29*, 143-149, 226, 229-231 (Dec. 1955).
507. "An all-plastic blister," Modern Packaging *29*, 98-101 (Dec. 1955).
508. "Battery acid in a bag," Modern Packaging *29*, 110-111, 255 (May 1956).
509. "Each item is a special problem in packaging plastic products," Modern Plastics *34*, 115-122 (Dec. 1956).
510. "Polyvinyl alcohol foam for artery grafting," by K. Owen, Brit. Plastics *29*, 212-214 (June 1956).
511. "Better catheters," Modern Plastics *33*, 188 (July 1956).
512. "Disposable specula," Modern Plastics *34*, 113, 227 (Nov. 1956).
513. "Polyethylene medicine dropper," Modern Plastics *34*, 213 (Nov. 1956).
514. "Optical lenses in plastics," Plastics (London) *21*, 41-42 (Feb. 1956).
515. "Hearing glasses," Modern Plastics *33*, 95-96 (July 1956).
516. "The toxicology of synthetic resins," by R. H. Wilson and W. E. McCormick, Ind. Medicine and Surgery *24*, 491-496 (Nov. 1955).
517. "Toxicology of plastics and rubber. Plastomers and monomers," by R. H.

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Wilson and W. E. McCormick, Ind. Medicine and Surgery *23*, 479-486 (Nov. 1954).

518. "Plastics in water pipes," by W. D. Tiedeman, Modern Plastics *33*, 166, 168, 173, 270, 272 (Apr. 1956).

519. "Small homes in plastics," Modern Plastics *34*, 124-125 (Dec. 1956).

520. "Plastics for structural uses," Product Eng. *27*, 167-182 (June 1956).

521. "New ideas in decorative surfacing," Brit. Plastics *29*, 238-242 (July 1956).

522. "Use of plastics in floor covering," Brit. Plastics *29*, 78-81, 116 (Mar. 1956).

523. "How to select floor covering materials for heavy service," by S. Polis, Materials and Methods *43*, 85-87 (Jan. 1956).

524. "Resistance-welded plastic pipe joints," Modern Plastics *34*, 150-151 (Nov. 1956).

525. "Fabrication and properties of Kralastic pipe," by P. M. Elliot, Plastics Tech. *2*, 301-304 (May 1956).

526. "Plastic pipes aim higher," Chem. Week *74*, 76-79 (Jan. 14, 1956).

527. "Wax-plastic films protect pipes," Chem. Eng. News *34*, 1132, 1134 (Mar. 5, 1956).

528. "Tough pumps for tough jobs," Modern Plastics *34*, 136-138 (Dec. 1956).

529. "From polyesters: equipment," Chem. Eng. News *34*, 1388-1391 (Mar. 19, 1956).

530. "Floating polyethylene retards evaporation," Modern Plastics *33*, 184 (July 1956).

531. "Sealability of gasketing materials on smooth and wavy flanges," by F. T. Thorn, ASTM Bulletin No. 210, 43-44 (Dec. 1955).

532. "Why plastics in furniture?" Modern Plastics *33*, 98-103, 212, 218, 220-221 (Aug. 1956).

533. "Teflon and nylon bearing materials," by A. J. Cheney, W. B. Happoldt, and K. G. Swayne, Materials and Methods *43*, 100-103 (Mar. 1956).

534. "Resin-bonded, laminated, and reinforced abrasive products," by P. L. Shanta, Ind. Eng. Chem. *47*, 2495-2499 (Dec. 1955).

535. "Formed for lighting," Modern Plastics *33*, 108-109, 243 (Apr. 1956).

536. "Solar battery uses plastics," Modern Plastics *33*, 104 (Feb. 1956).

537. "First sun-powered radio," Modern Plastics *34*, 134-135 (Oct. 1956).

538. "Precision fabrication makes versatile calculators," Modern Plastics *33*, 108-112, 228, 230, 233-234 (Mar. 1956).

539. "Superfine thermoplastic fibers," by V. A. Wente, Ind. Eng. Chem. *48*, 1342-1346 (Aug. 1956).

540. "Bond makes the difference," Chem. Eng. News *34*, 1269-1270, 1272 (Mar. 12, 1956).

541. "Fabric coating techniques," by E. G. Hamway, Plastics Tech. *2*, 175-177 (Mar. 1956).

542. "Bonded fabrics," by J. B. Campbell, Materials and Methods *43*, 116-119 (Feb. 1956).

543. "Chemical engineering aspects of the synthetic fiber industry," by G. H. Fremon and R. L. Stultz, Chem. Eng. Prog. *51*, 394-398 (Sept. 1955).

544. "Adhesives as a design tool," by A. E. Kott, Electrical Mfg. *57*, 87-93 (Feb. 1956).

545. "Adhesive bonding of metals," by S. N. Muchnick, Mechanical Eng. *78*, 19-22 (Jan. 1956).

546. "New epoxy adhesive," by B. Gould, Materials and Methods *42*, 140-142 (Dec. 1955).

547. "Epoxy adhesives at elevated temperatures," by E. W. McGuiness, Materials and Methods *43*, 120-122 (Mar. 1956).

548. "Epoxy-base adhesives in the aircraft industry," by W. Bandaruk, SPE J. *12*, 20-23 (Aug. 1956).

549. "Polyamide-epoxy combinations as structural adhesives," by D. E. Peerman, D. E. Floyd, and W. S. Mitchell, Plastics Tech. *2*, 25-28 (Jan. 1956).

550. "Polymer to metal adhesion. The system polyvinyl acetate-steel," by S. W. Lasoski, Jr., and G. Kraus, J. Polymer Sci. *18*, 359-376 (Nov. 1955).

551. "PVA woodworking glues," by J. A. Mills, Brit. Plastics *28*, 497-499 (Dec. 1955).

552. "Some chemical aspects of urea-formaldehyde wood adhesives," by J. A. Ross, Plastics Inst. Trans. and J. *24*, 278-292 (July 1956).

553. "Pressure sensitive tapes," by H. R. Clauser, Materials and Methods *43*, 123-138 (Mar. 1956).

554. "How gummed tape manufacture is controlled by isotope inspection," by H. E. Carlson, Paper Trade J. *140*, 22-23 (Apr. 23, 1956).

555. "Metal-bonding adhesives for high-temperature service," by J. M. Black and R. F. Blomquist, Modern Plastics *33*, 225-228, 230, 235-236 (June 1956).

556. "Choosing adhesives for plastics," by I. Skeist, Modern Plastics *33*, 121-123, 126-127, 130, 236 (May 1956).

557. "The adhesive properties of epoxy resins," by N. A. deBruyne, J. Applied Chem. *6*, 303-310 (July 1956).

558. "Effects of the electrostatic component of adhesion on bond strength," by S. M. Skinner and J. Gaynor, Plastics Tech. *1*, 626-631, 635 (Nov. 1955).

559. "Basic shear strength properties of metal-bonding adhesives as determined by lap-joint stress formulas of Volkersen and Goland and Reissner," by H. W. Eickner, U. S. Forest Products Lab. Rep. No. 1850 (Aug. 1955).

560. "Climbing peel test for strength of adhesive bonds," by F. Werren and H. W. Eickner, Modern Plastics *34*, 187 (Dec. 1956).

561. "Clock viscometer measures pot life," Modern Plastics *33*, 133 (Mar. 1956).

562. "Finishes for plastics," by J. B. Campbell, Materials and Methods *41*, 110-134 (June 1955).

563. "Coatings: How to sell a $700-million market," by H. Burrell, Chem. Week *78*, 71-72, 74, 76, 81-82, 86, 88 (Mar. 17, 1956).

564. "Cellulose lacquers," Ind. Eng. Chem. *48*, 1320-1329 (Aug. 1956).

565. "Lacquer or enamel?" J. B. Campbell, Materials and Methods *42*, 88-92 (Dec. 1955).

566. "Styrene and the surface-coating industry," by W. E. Allsebrook, Brit. Plastics *28*, 383-385 (Sept. 1955).

567. "Preparation and properties of polyurethane coatings," by Reilly and Orchin, Ind. Eng. Chem. *48*, 59 (Jan. 1956).

568. "Glossier paints," Chem. Eng. News *34*, 2697 (May 28, 1956).

569. "Tough decision at the finish line," Chem. Week *78*, 73-74 (Mar. 10, 1956).

570. "Coatings-annual review," by H. Burrell, Ind. Eng. Chem. *48*, 28A-29A (Jan. 1956).

571. "Mechanism of wash primer action," by L. Kruger and M. C. Bloom,

Ind. Eng. Chem. 48, 1354-1360 (Aug. 1956).
572. "Accelerated tests for mildew resistance of oil paints," by R. M. Evans and E. G. Bobalek, Ind. Eng. Chem. 48, 122-125 (Jan. 1956).
573. "Evaluating physical properties of coatings," by J. I. Richardson, Chem. Eng. 62, 242, 244, 248 (Nov. 1955).

Properties

574. "Plastics: engineering materials," by C. H. Adams, Modern Plastics 33, 127-128, 130, 132, 134, 136, 138, 139, 201 (July 1956).
575. "Plastics as mechanical-engineering materials," by J. A. Bjorksten, Mechanical Eng. 78, 337-340 (Apr. 1956).
576. "Developing design data for plastics," by R. K. Multer and R. H. Rayfield, Materials and Methods 43, 132-135 (Apr. 1956).
577. "Spectral-transmissive properties of plastics for use in eye protection," A.S.A. Committee on Eye Protection, American Standards Assoc. Report, 48 p. (1955).
578. "Effects of explosions on plastics," by H. A. Perry, Jr., SPE J. 12, 13-16, 43 (July 1956).
579. "Non-destructive mechanical test for degradation. I. Degradation study," by C. D. Doyle, Modern Plastics 33, 143-144, 146, 148; "II. Method of test," by C. S. Duckwald, ibid 148, 153-154 (Mar. 1956).
580. "Effect of fillers on the dynamical mechanical properties of polystyrene," by L. E. Nielsen, R. A. Wall, and P. G. Richmond, SPE J. 11, 22-23, 46, 61 (Sept. 1955).
581. "Dynamic creep of plastics," by J. Marin and W. J. Schuman, SPE J. 11, 18-21, 54 (Sept. 1955).
582. "Apparatus for the direct determination of the dynamic bulk modulus," by J. E. McKinney, S. Edelman, and R. S. Marvin, J. Applied Phys. 27, 425-430 (May 1956).
583. "Dynamic mechanical properties of polystyrene, polyethylene, and polytetrafluoroethylene at low temperatures," by J. A. Sauer and D. E. Kline, J. Polymer Sci. 18, 491-495 (Dec. 1955).
584. "An apparatus for measuring the response of polymeric materials to an oscillating strain," by B. Maxwell, ASTM Bulletin No. 215, 76-80 (July 1956).
585. "Vibrating reed test for plastics," by S. Strella, ASTM Bulletin No. 214, 47-50 (May 1956).
586. "Relation between the structure of polymers and their dynamic and electrical properties. II. Glassy state mechanical dispersions in acrylic polymers," by E. A. W. Hoff, D. W. Robinson, and A. J. Willbourn, J. Polymer Sci. 18, 161-176 (Oct. 1955).
587. "The effect of static mean stress on the damping properties of materials," by N. L. Person and B. J. Lazan, Proc. A.S.T.M. 56, preprint (1956).
588. "Analysis of dynamic tests of viscoelastic materials," by E. H. Lee and D. R. Bland, SPE J. 11, 28-31, 34-35 (Sept. 1955).
589. "Visco-mechanical concept of plastics testing," by L. A. Darling, Plastics Tech. 2, 17-21, 34 (Jan. 1956).
590. Stress relaxation studies of the visco-elastic properties of polymers," by A. V. Tobolsky, J. Applied Phys. 27, 673-685 (July 1956).
591. "Tensile strength of plastics above the glass temperature," by F. Bueche, J. Applied Phys. 26, 1133-1140 (Sept. 1955).
592. "The nature of tensile rupture," by I. J. Gruntfest, J. Polymer Sci. 18, 449-454 (Dec. 1955).
593. "Tensile rupture of hard plastics," by I. J. Gruntfest, J. Polymer Sci. 20, 491-494 (June 1956).
594. "High-speed tension testing machine for plastics," by J. Dorsey, F. J. McGarry, and A. G. H. Dietz, ASTM Bulletin No. 211, 34-37 (Jan. 1956).
595. "Tension testing apparatus for the temperature range of —320° F. to —452° F.," by E. T. Wessel, ASTM Bulletin No. 211, 40-46 (Jan. 1956).
596. "Effects of tensile preloading and water immersion on flexural properties of a polyester laminate," by R. L. Youngs, U. S. Forest Prod. Lab. Rep. No. 1856, 18 pp. (June 1956).
597. "Tensile-impact: a simple meaningful impact test," by C. G. Bragaw, Modern Plastics 33, 199-203, 206 (June 1956).
598. "A method for evaluating low temperature shock resistance," by L. S. Buchoff, SPE J. 21, 34-35, 52 (Aug. 1956).
599. "A bend-test method of determining the stress required to cause creep in tension," by J. B. Wachtman, Jr. and L. H. Maxwell, ASTM Bulletin No. 211, 38-39 (Jan. 1956).
600. "An axial loading creep machine," by M. H. Jones and W. F. Brown, Jr., ASTM Bulletin No. 211, 53-58 (Jan. 1956).
601. "Application of the superposition principle and theories of mechanical equation of state, strain, and time hardening to creep of plastics under changing loads," by W. N. Findley and G. Khosla, J. Applied Phys. 26, 821-832 (July 1955).
602. "Application of the theory of absolute reaction rates to the creep failure of polymeric filaments," by B. D. Coleman, J. Polymer Sci. 20, 447-455 (June 1955).
603. "Friction of plastics," by F. P. Bowden, Rubber and Plastics Age 37, 43 (Jan. 1956).
604. "Evaluation of the Boor-Quartermaster snag tester for coated fabrics and plastic films," by F. W. Reinhart, C. Brown, L. Boor, and J. J. Lamb, ASTM Bulletin No. 210, 50-59 (Dec. 1955).
605. "Weathering of plastics, by J. J. Gouza and W. F. Bartoe, Modern Plastics 33, 157-158, 160, 162, 244 (May 1956).
606. "Fluorescent sunlamps in laboratory aging tests for plastics," by F. W. Reinhart and M. K. Mutchler, ASTM Bulletin No. 212, 45-51 (Feb. 1956).
607. "Thermosetting moldings in the tropics," Brit. Plastics 29, 224 (June 1956).
608. "Effects of corona on plastic laminates," by A. Rufolo and R. R. Winans, ASTM Bulletin No. 214, 53-56 (May 1956).
609. "Corona properties of insulating materials," by W. T. Starr, Electrical Mfg. 57, 132-139 (June 1956).
610. "Arc resistance: Radio-frequency corona resistance," by M. Olyphant, Jr., ASTM Bulletin No. 216, 47-55 (Sept. 1956).
611. "Effects of high humidity on dielectric properties of casting resins," by H. K. Graves and M. A. Pizzino, Electrical Mfg. 57, 89-93 (Apr. 1956).
612. "Heat distortion temperature measurements for evaluation of thermoplastics," by J. J. Gouza and W. F. Bartoe, Plastics Tech. 2, 89-93 (Feb. 1956).
613. "An autographic apparatus for the



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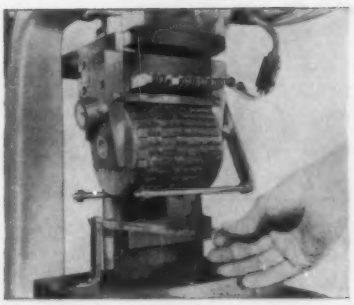
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study of thermal distortion," by M. T. Watson, G. M. Armstrong, and W. D. Kennedy, Modern Plastics *34*, 169-170, 172, 174, 176, 178, 258-259 (Nov. 1956).

614. "Heat capacity of polyisobutylene from 0° to 380° K., by G. T. Furukawa and M. L. Reilly, J. Research NBS *56*, 285-288 (May 1956).

615. "Specific heat of synthetic high polymers, V. A. study of the order-disorder transition in polytetrafluoroethylene," by P. Marx and M. Dole, J. Am. Chem. Soc. *77*, 4771-4774 (Sept. 20, 1955).

616. "Variation of photoelastic behavior with temperature for some polymers," by K. Kawata, J. Polymer Sci. *19*, 359-364 (Feb. 1956).

617. "Apparatus for making simultaneous stress and birefringence measurements of polymers," by E. F. Gurnee, L. T. Patterson, and R. D. Andrews, J. Applied Phys. *26*, 1106-1110 (Sept. 1955).

618. "Index of refraction and particle size as factors in the infra-red spectrophotometry of polyvinyl chloride," by M. R. Harvey, J. E. Stewart, and B. G. Achhammer, J. Research NBS *56*, 225-235 (Apr. 1956).

619. "Water sorption in heat-treated polystyrene and plasticized polyvinyl chloride," A. G. Day, British Electrical Res. Assoc. Tech. Rep. L/T344 (1956).

620. "Water absorption by polymers," by J. A. Enderby, Trans. Faraday Soc. *51*, 106-116 (Jan. 1955).

621. "Moisture permeability of glove materials for controlled-atmosphere boxes," by J. H. Rowan, Analytical Chem. *28*, 402-403 (Mar. 1956).

622. "Proposed method of test for water vapor transmission of building materials utilizing the Penn State-Armstrong cell," ASTM Bulletin No. 215, 63-65 (July 1956).

623. "Permeability of polymer films to gases and vapors," by R. Waach, N. H. Alex, H. L. Frisch, V. Stannett, and M. Szwarc, Ind. Eng. Chem. *47*, 2524-2537 (Dec. 1955).

624. "Permeability of polymer films to hydrogen sulfide gas," by W. Heilman, V. Tammela, J. A. Meyer, V. Stannett, and M. Szwarc, Ind. Eng. Chem. *48*, 821-824 (Apr. 1956).

625. "Gas permeability of plastics film. I. Accuracy and sensitivity of the measurements," by W. Schrüfer, Kunststoffe *46*, 143-147 (Apr.); "II. A highly sensitive new instrument," ibid. 270-273 (July 1956).

626. "A compact osmometer," by J. A. Yanko, J. Polymer Sci. *19*, 437-444 (Mar. 1956).

627. "Error in osmometry," by Z. Mencik, J. Polymer Sci. *18*, 424-427 (Nov. 1955).

628. "Measurement of viscosity-average molecular weight of polymer solutions of unknown concentration," by H. L. Frisch and S. J. Yeh, J. Polymer Sci. *20*, 431-435 (June 1956).

629. "Role of crystallization in polymers and proteins," by P. J. Flory, Science *124*, 53-60 (July 13, 1956).

630. "An independent measurement of the amorphous content of polymers," by G. J. Miller and H. A. Willis, J. Polymer Sci. *19*, 485-494 (Mar. 1956).

631. "Ultrasonic waves as a measure of cure," by A. G. H. Dietz, E. A. Hauser, F. J. McGarry, and G. A. Sofer, Ind. Eng. Chem. *48*, 75 (Jan. 1956).

632. "Polarographic determination of phthalic anhydride in alkyd resins," by P. D. Garn and E. W. Hailline, Analytical Chem. *27*, 1563-1565 (Oct. 1955).

633. "Determination of mixed phthalic acid isomers in alkyd resins," by M. H. Swann, M. L. Adams, and D. J. Weil, Anayltical Chem. *27*, 1604-1606 (Oct. 1955).

634. "Colorimetric determination of bisphenol-type epoxy resins and their fatty acid esters," by M. H. Swann and G. G. Esposito, Analytical Chem. *28*, 1006-1007 (June 1956).

635. "Polarographic determination of methyl methacrylate monomer in polymers," by R. J. Lacoste, I. Rosenthal, and C. H. Schmittinger, Analytical Chem. *28*, 983-985 (June 1956).

636. "Determination of free phenol in polyoxyethylene phenyl ethers," by C. F. Smullin and F. P. Wetterau, Analytical Chem. *27*, 1836-1838 (Nov. 1955).

637. "The properties and testing of plastics materials," by A. E. Lever and J. Rhys, Plastics (London) *21*, 255-256 (Sept); 286-288 (Oct. 1956).

638. "International plastics meetings," Modern Plastics *34*, 123 (Dec. 1956).

639. "International standardization of plastics pipe," Modern Plastics *34*, 208, 296 (Oct. 1956).

640. "Report of A.S.T.M. Committee D-20 on Plastics," Proc. A.S.T.M. *56*, preprint (1956).

641. "Report of A.S.T.M. Committee D-14 on Adhesives," Proc. A.S.T.M. *56*, preprint (1956).—End

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The Plastiscope

News and interpretations of the news
By R. L. Van Boskirk

Section 2 (*Section 1 starts on p. 47*)

The new Delrin

High tensile strength; toughness; high melting temperature; good fatigue life, dimensional stability, and solvent resistance; and resistance to deformation are the particular properties exhibited by Delrin, the new acetal resin now under study in the Du Pont laboratories. The company describes it as suitable for a wide range of engineering applications which require a material able to retain its properties under conditions of high temperatures and humidity during an extended time under stress or on exposure to most solvents.

When Du Pont speaks of a material suitable for "engineering applications," the company generally means a material that can be designed for rough and tough applications where the low-cost, big volume thermoplastics are not ordinarily applicable. Materials like nylon and Teflon are implied —indeed the company speaks of Delrin as a possible complement to its Zytel nylon resins without making any comment on its future price structure.

However, Delrin is distinctly different from nylon in several respects. First and perhaps most important, Delrin has almost no water absorption—0.4% after 24 hr. immersion. It is almost completely stable under all types of moisture conditions. Another way of describing its splendid low moisture absorbing property is to say that long-time, or equilibrium, moisture content is 0.2% under 50% relative humidity, or 0.9% when completely immersed. Delrin is also more stiff than nylon, doesn't stain, and may have better light resistance so that it could be used for indoor hardware on windows or other places that are exposed to sunlight.

The distortion point of Delrin under a high load of 264 p.s.i. is 212° F.; under a low load of 66 p.s.i., it is 340° F. The material has good stiffness above 300° F. at intermittent periods, or 250° F. for a sustained period. In most thermoplastics, the high and low load heat resistance is about the same and often below boiling temperature. Delrin's heat resistance is great enough that it could be used under the hood of an automobile or in crank cases.

Another good property is fatigue endurance; it has been successfully tested under 5000 p.s.i. for long periods of time without failure.

Delrin's specific gravity is 1.425; flammability, 1.1 in./min.; melting point (crystalline), 347° F.; and flow temperature, 360° F.

It is produced as a cylindrical molding powder ⅛ by ⅛ in. in natural, white, or colored and in either a general-purpose molding or extrusion resin. It can be injection molded in standard equipment; extruded into pipe, rod, tubing, jacketing, sheeting, and shapes; blow molded into bottles; and machined from rods, cylinders, or disks.

Tests indicate that it may be used for aerosol bottles, gears, tumblers, squirrel cage blowers, telephones, showerheads, bearings, cutlery handles, housewares, and automobile parts, as well as wire coating.

The base material used for acetal is formaldehyde, a fairly low-cost raw material, but Du Pont discourages any idea that Delrin may be less costly than nylon. The acetal used for Delrin bears no more resemblance to the polyvinyl acetal derived from vinyl acetate than cotton does to wool. It is an entirely new material that bears no close similarity to any other plastic material.

Du Pont calls particular attention to the fact that Delrin is still a development material with engineering studies being carried on for a commercial production unit. Field tests are being conducted, using resin produced from a pilot plant, to guide its use into suitable applications. Should the tests prove successful, Delrin would then be available for unlimited sale in 1959.

*Reg. U.S. Pat. Off.

New acrylic monomer

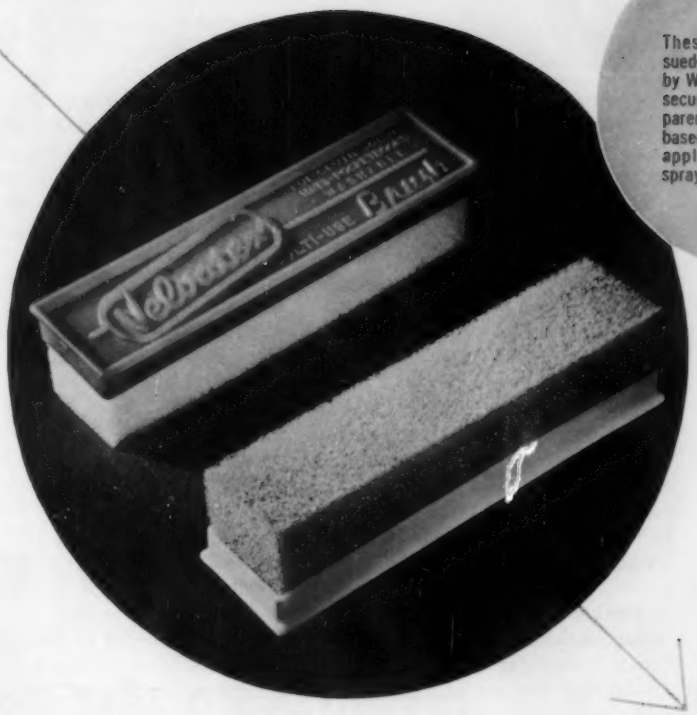
Dimethylaminoethyl methacrylate monomer is now available in pilot plant quantities from Rohm & Haas Co., Philadelphia, Pa. The new water- and solvent-soluble monomer, which is supplied with 0.25% N,N' -diphenyl-p-phenylene diamine (DPPD) as an inhibitor, may be polymerized with an azo-type catalyst such as azoisobutyronitrile, by irradiation with ultra-violet light, or in aqueous solution with peroxide catalysts, provided that the amine group is first neutralized with an acid to give a water-soluble salt.

Copolymers of dimethylaminoethyl methacrylate have been formed with methacrylic acid, methacrylate esters, and with acrylonitrile. It is expected that the monomer may be copolymerized with other monomers such as butadiene and vinyl acetate.

Suggested applications include anchoring agent for pigments, waxes, and oils to paper, fabrics, and leather; antistatic agents for synthetic fibers; butadiene copolymers for oil-resistant synthetic rubber; ion exchange resins; acid acceptors; stabilizer for chlorinated polymers, etc.

Carbon black dispersions

Two concentrated colloidal dispersions of carbon black made by Columbian Carbon Co., 380 Madison Ave., New York, N. Y., are said to offer special advantages and economies to manufacturers of high-grade acrylic lacquers and nitrocellulose lacquers. According to the company, lacquers formulated with these new dis-



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Staff changes

Joel Frados, Associate Editor of MODERN PLASTICS Magazine, and responsible in recent years for many of its General Section features, has been appointed Editor of MODERN PLASTICS Encyclopedia Issue.



J. Frados

The appointment was occasioned by the tremendous growth of the plastics industries, the increasing pace of technical developments, the broadening range of plastics applications, and the physical growth of the world-famous Encyclopedia Issue

Mr. Frados, a graduate of the City College of New York in Business Administration and with graduate work in journalism at Brooklyn College and New York University, joined the staff of MODERN PLASTICS Magazine as Assistant Managing Editor in 1951, becoming Associate Editor in 1952. He is well known at all levels of the plastics industry, is a member of S.P.I. and S.P.E., and an officer of the Public Relations Committee of S.P.E. He is a public speaker of considerable repute on the subject of plastics applications. He brings to his new post five years of intensive training in the presentation of facts about plastics and close acquaintance with all major developments in plastics. Mr. Frados will also continue to serve as an Associate Editor of MODERN PLASTICS.

William Schlefer, formerly Director of Market Research, Modern Plastics Research Corp., has been appointed an Associate Editor of MODERN PLASTICS Magazine. A graduate of the University of Chicago with the degree of Master of Business Administration in 1950, Mr. Schlefer, after service with the infantry, was successively Midwest Supervisor of Market Research for the National Analysts Div. of The Curtis Publishing Co. and Senior Market Analyst at the General Chemical Div., Allied Chemical and Dye Corp., before coming to Modern Plastics Research Corp. In his capacity as Associate Editor he will spend much of his time in the field studying and reporting on new applications, new developments, and marketing trends.



Wm. Schlefer

Citrus for terpenes

A pure form of d-Limonene, used in the production of synthetic terpene chemicals and resins, is now offered in tank car quantities by Florida Molasses Corp., Auburndale, Fla. This oil heretofore had been in limited supply.

d-Limonene is the main constituent of orange and grapefruit oil and is recovered as a by-product in the manufacture of citrus pulp and molasses.

Nylon extrusions offered

Addition of Chemiseal Nylon 101 to its line of plastics materials (Teflon, Kel-F, and fluorothene fluorocarbons; polystyrene; polyethylene; etc.) has been announced by United States Gasket Co., fabricating subsidiary of Garlock Packing Co., Camden, N. J.

Chemiseal Nylon 101 is available in extruded rods (25 standard sizes from 1/16 to 3 in.) and extruded tubing in an infinite number of combinations of O.D., I.D., and wall thicknesses. (O.D. ranges from 5 mils up to the largest sizes produced commercially). Extruded special shapes, such as gear blanks, channels, cam blanks, angles, or practically any other desired cross-section, are available to volume purchasers.

High-speed, low-cost automatic machining of nylon parts to customer specifications and injection molding facilities for the production of parts in large volume are also available.

Textured vinyl-clad metal

Steel and aluminum coated with textured and colored vinyl in gages from 18 to 30 is now available from Sun Steel Co., 1702 W. 74th St., Chicago, Ill.

Designated Texkote, the material is produced as follows: An adhesive is applied to the metal and heated. After cooling, a 0.002- to 0.20-in. film of liquid vinyl is applied. The material is then heated again and embossed. Rapid cooling follows to maintain maximum pattern definition.

Texkote can be deep drawn, roll formed, or punched; it can undergo other pressing-stamping operations without damage. The coating is practically an integral part of the metal to which it is joined.

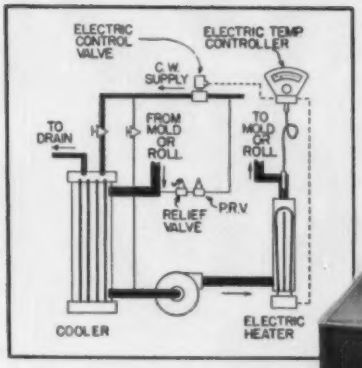
Applications include carrying cases, luggage, appliances, automotive and aircraft trim, furniture, wall panels, tile, and all types of cabinets.

Research on cutting foam

The vexatious problems of cutting styrene, urethane, vinyl, rubber, and other foams efficiently are now being tackled by Falls Engineering & Machine Co., Cuyahoga Falls, Ohio, with the establishment of a laboratory and research center devoted to the question of die cutting and splitting such materials.

Test cutting in the laboratory will be conducted on special machinery developed by the company. Among the machines already permanently installed in the laboratory are a heavy-duty roller die cutter with an auto-

combination with natural adhe-



Schematic sketch of the control circuit in the Sarcotrol Model MC-1, Single Unit. Model MC-2, Dual Unit, is equipped with two of these circuits, MC-3 has 3 circuits.



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COMPLETELY redesigned, the new *Sarcotrol* heating and cooling unit is fully automatic as shown in the following list of features. It maintains even face temperatures by recirculating temperature-controlled water at high velocity through molds or roll jackets. Check *Sarcotrol's* features against any other unit *before* you buy.

Sarcotrol gives you *all* these features

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- **Independent circulating systems** — the Sarcotrol is available with one, two or three independent systems (see above sketch).
- **Simple, sensitive control** — one knob changes temperature control setting; sensitive thermostat (±1°) minimizes temperature lags; easy-to-read dial shows both desired and actual temperatures.
- **Automatic selection of heating rate** — for fast heat-up; then close control.
- **Saves electricity and water** — the *same* thermostat regulates both *rate* of heat input and cooling; cuts out both when set temperature is reached.
- **Automatic heater protection** — heaters are automatically cut off when pump is shut down.
- **Many other features** — are listed in the *Sarcotrol* technical bulletin.

2169-B

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matic loading and unloading mechanism and a leveling and splitting machine with automatic attachment. More equipment will be added later, including semi-automatic splitters.

Falls Engineering asserts that companies having production cutting problems will be able to send samples of their material to the laboratory and receive written reports on the cutting qualities after tests are made.

Alpha olefins

Commercial quantities of alpha olefins are now available from Chemical Products Div., Archer-Daniels-Midland Co., Minneapolis, Minn. These products are derived from fatty alcohols and will be processed in ADM's year-old fatty alcohol plant in Ashtabula, Ohio.

According to the company, the olefins are almost colorless, odorless liquids (at room temperatures), unusually reactive, and have good solubility characteristics. Suggested applications are in plastics, polymers, chemical synthesis, petroleum additives, textile agents, and surfactants.

Vinyl-coated fabrics up

Price increases averaging 4% on its vinyl-coated Naugahyde upholstery material has been announced by United States Rubber Co. Some lightweight Naugahyde items have been increased 10 percent. The price of heavy-weight glazed antique Naugahyde remains unchanged.

Latest nuclear facility

A 1-million-w. research reactor has been put into operation by Battelle Memorial Institute, Columbus, Ohio, at its Nuclear Research Center. Designed exclusively for research purposes, the newly completed reactor is basically a source of gamma rays and neutrons. These two products will be used in research on the chemistry of petroleum, sterilization of pharmaceutical products, preservation of agricultural goods, and improvement and development of numerous plastics, chemical, glass, ceramic, and metallic products and processes.

The Nuclear Research Center is at liberty to contract with private industry for nuclear research without government security restrictions.

Other facilities for nuclear research available at Battelle include a hot cell laboratory, gamma irradiation facility, radioisotope laboratory, etc.

Among recent contracts granted for research at Battelle is one with Esso Research & Engineering Co., New York, N. Y., for comprehensive experimentation, specifically aimed at establishing ways of using nuclear radiation in the production of petrochemicals and in petroleum refining.

Anti-fungus additive

Originally developed by Esso Research & Engineering Co. as SR-406 and used as an agricultural spray, N-trichloromethylthio tetrahydrophthalimide is now showing promise as an additive in plasticized vinyl formulations.

Laboratory work by R. T. Vanderbilt Co., Inc., 230 Park Ave., New York, N. Y., is said to indicate that Vancide 89 (Vanderbilt's designation for SR-406) makes plasticized vinyl film mold- and fungus-resistant and improves its low-temperature flexibility.

Latex for paper coating

Styrene-butadiene copolymer latex, fortified during polymerization with an additional undisclosed ingredient to enhance its properties, is now being offered by Koppers Co., Inc., Pittsburgh, Pa., under the tradename Dylex latex K-52 for coating of printing paper.

The latex is claimed to have good compatibility with the starch, dextrin, and protein adhesives commonly used in the paper industry. It may be used in paper coating either alone or in combination with natural adhesives and clays to improve printability and ease coating problems. One of the factors contributing to improved characteristics in the new latex is said to be its fine particle size in comparison with other high-styrene latices.

Decoration for laminates

Decorative items suitable for incorporation between plastic sheets by laminators are now available from Richoux Co., Inc., 610 Fifth Ave., New York, N. Y. The items include staples, non-bleeding flitter, butterflies, leaves, etc.

Railroad saves with Plexiglas

By switching from glass to acrylic glazing for the drop side-window in the motorman's cab of suburban multiple-unit cars, the Pennsylvania Railroad is saving $3500 a year in replacement costs and an additional amount for personal injury claims. Railroad officials estimate that the breakage rate for the 2- by 2½-ft. glass windows was about 100% a year; by replacing them with ⅛-in. Plexiglas panes, the company reports no breakage has occurred during the past year. The lightweight plastic panes also facilitate window opening and closing.

Plexiglas sheet, from which the windows are fabricated, is produced by Rohm & Haas Co., Philadelphia, Pa.

Industrial Designers elect

New officers elected by the American Society of Industrial Designers are as follows: president—Jay Doblin, director of the Institute of Design at Illinois Institute of Technology; vice president—William Goldsmith; secretary—Kenneth Van Dyck; treasurer—Francis Braun.

New polyester

A new general-purpose molding resin has been added to the Marco polyester resin line of Celanese Corp. of America. Designated MR-42R, it is claimed to have good resistance to crazing or cracking in resin-rich areas of the molding. Molding cycle, mold release, lack of mold scumming, degree of fiber wetting, hot strength of molded part, surface gloss, and resistance to warping are said to

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be superior or equivalent to similar resins. According to Celanese, preliminary evaluation indicates that MR-42R resin also is promising in the premix molding field.

MR-42R resin is priced competitively with other matched-metal mold resins in popular use today.

Pricing policy change

Untreated polyethylene tubing made by Food Film, Inc., Caldwell Township, N. J., will henceforth be sold on an F.O.B. basis, freight allowed, for all single orders of 500 lb. and up. This supersedes the firm's previous straight F.O.B. policy.

Purpose of the change, of particular interest to polyethylene converters in the south, midwest, and west, is to place all volume customers on an equal basis regardless of location.

More liberal terms

Buyers of Fellows Gear Shaper Co. plastics injection molding machines are now offered a graduated installment financing program that stretches terms out to eight years in contrast to the previous maximum term of three years. The program provides for monthly installments so figured that the payments made on a machine during any one year will approximate the amount that can be depreciated during that year.

The plan was devised by C.I.T. Corp., industrial financing firm.

A.S.T.M. radiation studies

Formation of a subcommittee to study the effects of nuclear and high-energy radiation on the properties of plastics and electrical insulation has been announced by the American Society of Testing Materials, 1916 Race St., Philadelphia, Pa. Chairman is D. S. Ballantine, Brookhaven National Laboratory.

Prime objective of the subcommittee will be to establish, where possible, standard methods of irradiation and standard methods for determining the effects of radiation on the physical and chemical properties of plastics and electrical insulation.

Ink prices down

Price reductions averaging 10% have been announced by Claremont Pigment Dispersion Corp., Roslyn Heights, N. Y., on its recently introduced RP series of inks for gravure printing on treated polyethylene film. The inks are said to give bright, intensely colored prints, sharply defined and with excellent scratch- and abrasion-resistance.

Source for styrene sheet

Polystyrene sheet in gages from 30 to 250 is now available from The Gilman Brothers Co., Gilman, Conn. Designated Gilco Pelican high-impact polystyrene sheet (grained), it is intended for wall covering, seating, office and home furniture, tote boxes, and luggage. Seventeen colors in both Dow 475 high-impact and Dow 480 super high-impact material are offered.

The company is also extruding 10- to 250-mil polyethylene sheet from Du Pont's Alathon, Dow's 500 E, Spencer's Hi-D, and Phillips' Marlex.

Arc suppressor patented

U. S. Patent No. 2,763,758 has been issued to Radio Receptor Co., Inc., 251 W. 19th St., New York, N. Y., for its Thermatron arc suppressor. The suppressor is a device that anticipates arcing and automatically shuts off power in radio frequency generators used in electronic bonding.

Extrusion aid

A slip agent for use in polyethylene is now available from Fine Organics, Inc., 211 E. 19th St., New York, N. Y. Designated FO-255 Slip-Eze, the material is supplied as a dry powder to facilitate mixing with the extrusion compound. Slip-Eze is claimed to have anti-static properties, not to impart color to the extruded product, to be low in soap and fatty acid contents, and low in toxicity. Dosage recommended is ¼ oz. per 50 lb. of polyethylene.

Fine Organics also offers a line of Safe-Tee industrial solvents, including cellulose strippers, resin solvents and softeners, print roller cleaners, etc.

Polyester colorants

Nineteen basic color pastes for use with polyester resins, called the 4000 series, have been developed by Claremont Pigment Dispersion Corp., Roslyn Heights, N. Y. Additional colors can be obtained by blending two or more pastes. The pastes are added to the resin before the curing agent. According to the company, they produce greater color uniformity in reinforced plastics products than do dry colorants.

Another line of color pastes, Stan-Tone PEC, is manufactured by Sinclair & Valentine and offered by Harwick Standard Chemical Co. This line consists of 12 colors and Harwick states that no retardation of cure or acceleration of set time has been observed with any of these pigments.

Improved laminate

A paper-base phenolic laminate with good electrical properties and cold punching and cold shearing characteristics has been developed by Synthane Corp., Oaks, Pa. Designated P-25, the material is said to punch clean and sharp at room temperature, eliminating hot punching shrinkage allowance and heating equipment. It is recommended by the company for copper clad laminates used in printed circuitry.

P-25 is available in 36- by 36-in. sheets, 1/32 through 1 in. thick.

Report on PVA paint

Half of the latex paints sold in 1960 will be of the PVA type, as compared with about 20% in 1956 according to a Celanese estimate. In 1948, sales of all latex paints (styrene-butadiene, acrylic, and PVA) amounted to 2 million gal.; by the end of 1956, they were moving at a 60 million-gal./year clip.

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by Celanese and other companies to formulate emulsions for exterior wood. While some formulations appear to have excellent properties, conservative paint manufacturers generally require a lengthy period of field testing. Therefore, only small quantities of exterior paint for use over old paint have found their way to retail hardware stores so far.

Paper coating price down

A price reduction of 2¢ per lb. for Rhoplex B-15 acrylic binder for paper coatings has been announced by Rohm & Haas Co., Philadelphia, Pa.

Advantages claimed for Rhoplex B-15 include: exceptional printing quality, good gloss and smoothness, flexibility, outstanding color and color retention, freedom from taste and odor, low viscosity, and unusual mechanical and chemical stability.

New development company

Polymer Engineering & Development Corp., 400 Adams St., Newark, N. J., has been organized for the purpose of offering pilot plant facilities, process development, engineering design, and construction of resin and polymer plants; services will also include plant design and lay-out for resin and plastic fabrication.

The new firm is an adjunct to Resin Research Laboratories, Inc., Newark, N. J., which was formed many years ago to service industry requiring research in resins and polymers. Charles P. West is president; Donald Palais, vice president; and Saul Palais, treasurer.

Enters lining field

Tubular Lining Corp., Robin Blvd., Houston, Texas, has been formed to specialize in the application of corrosion-resistant plastic linings to the interior of oil field tubing. The firm's plant, located on a 10-acre site, is equipped with machinery which is said to automatically apply linings to 5000 lineal ft. of tubing each working shift. Capacity of the initial unit is 1.8 million ft. of tubing per year. Linings applied to the pipe will be of the baked phenolic variety, using phenol formaldehyde applied and baked in several successive coats.

L. E. Heinen is president.

Fire at Hexcel

A five-alarm fire recently ripped through the Oakland, Calif., glass-fabric plant of Hexcel Products, Inc., destroying 50% of the fibrous glass and plastics honeycomb facilities. The burned area represents approximately 6% of the firm's total manufacturing area, according to company officials. Roger C. Steele, president, states that production of fibrous-glass fabric will be resumed shortly.

Sales-service firm formed

Establishment of Plastic Machinery Sales Co., 16801 Euclid Ave., Cleveland, Ohio, has been announced. The company will represent Lewis injection molding machines, Ball & Jewell granulators and heater dryers, Glengarry weigh feeding machines, Rampe tumbling machines, and Wheelco instruments and will maintain a qualified service man to service all products sold.

Plastic Machinery is headed by C. E. ("Bing") Miller, formerly sales manager of the Plastic Div. of The Lewis Welding and Engineering Corp.

Walnut shells for plastics

A line of walnut shell flours, grits, and abrasives is offered by Harwick Standard Chemical Co., 60 S. Seiberling St., Akron, Ohio. Designated Stan-Shell and produced by Industrial Flour & Abrasive Co., these products are available in a variety of mesh sizes and find various applications in plastics.

Fine nutshell flours, in mesh sizes 100, 200, and 325, are suggested for use as fillers for plastics and rubber, as well as extenders and fillers for phenolic resins. The coarser materials are suggested for use in air blast cleaning of molds and other products.

Industrial chemical

Surface-active lignin sulfonates are now being marketed by Crown Zellerbach Corp., Camas, Wash. Designated Orzans, the chemicals are said to precipitate readily from solutions and to cling to fibers or other materials present. Recommended uses are as a binder for fibers, retention of fines, an emulsifier, an emulsion stabilizer, a flocculant, and a dispersant. Additional possible uses, demonstrated in the company's laboratory, include applications as an extender in polyvinyl adhesive, as an ingredient and extender in phenolic resins, etc.

Protective coating

A baked synthetic protective coating has been announced by American Nickeloid Co., Peru, Ill. Called Bakekote, it contains a thermosetting resin said to have good film-forming properties.

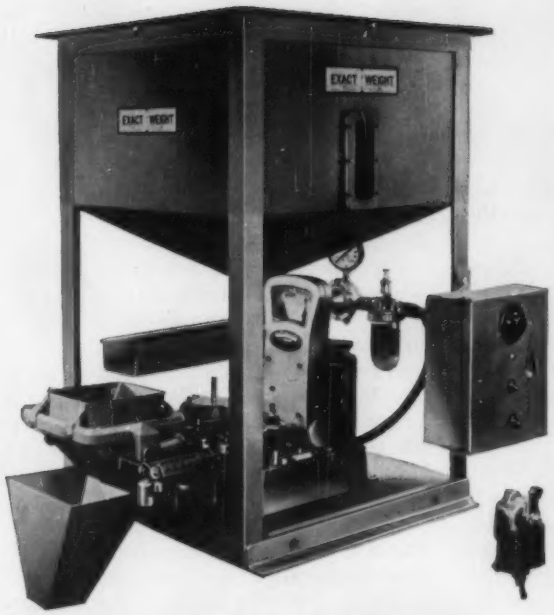
The company asserts that metals coated with the new film can be drawn, press formed, stamped, roll formed, and seamed with no peeling, cracking, or flaking of the protective film.

Bakekote-coated Nickeloid metals are being used for door hardware, switch plates, light fixtures, housewares, and for other functional and decorative purposes.

Borden widens scope

In a move to further expand its activities in the broad field of forest products, The Borden Co.'s Chemical Div. has established a Forest Products Research Group for extensive, long-range work, with an immediate objective of developing resin and polymer products especially adapted to new applications. The new group will be headed by Dr. George Kitazawa, former research physicist for Gillette Co. and other firms. It will become a part of the Central Research Laboratory in Philadelphia, but its program will be in addition to and beyond the division's present research operations.

Forest products development



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1 **Don't sacrifice quality in your vinyl formulations!** Don't use inadequate secondary plasticizers! Get a primary plasticizer—Polycon #40 (a pure phthalate) at the economy level.

Polycon #40 was developed for use in vinyl flooring, welting, garden hose and other extruded vinyls where slight plasticizer coloration is acceptable. Polycon #40 is also used in coated fabrics, slush and dip moldings, wire and cable coverings.

BROWN-ALLEN Polycon #40's features make it ideal for extrusion compounds. Among these features are:

- Superior solvation
- Excellent toleration for low-cost plasticizer extenders
- Gelation and cure rates that help increase production in plastisols
- Greater toleration of filler loads

In addition, BROWN-ALLEN Polycon #40 offers a higher electrical resistivity than DOP by actual test on compounded products.



2 **For a low-cost replacement for n-Octyl n-Decyl Phthalates** where low temperature and low volatility are desirable, look into BROWN-ALLEN Polycon #5B.

Used in plastisols, BROWN-ALLEN Polycon #5B offers improved flow-out properties, slow gelation and fast cure in addition to low viscosity and excellent viscosity stability. This results in superior definition in complex molds.



3 **Whether you buy plasticizers in drums, tank wagons or tank cars,** find out about BROWN-ALLEN DOP, DIOP, ODP, DBP and DDP. Like all BROWN-ALLEN products, these plasticizers are precisely uniform, competitively priced and of dependably high quality.

For free samples, technical assistance and price information, *write today.*

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B-A

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work, primarily in industrial adhesives, has been carried out heretofore in Borden laboratories at Bainbridge, N. Y., Seattle, Wash., Leominster, Mass., and Philadelphia, Pa., and will be continued there.

Epoxy news

Two new epoxies have been added to its line of Maraset resins by Marblette Corp., 37-31 Thirtieth St., Long Island City, N. Y.

Maraset rubber-like resin #636 is claimed to be a tough, flexible compound with high dimensional stability, resistance to heat and chemicals, good recovery characteristics, and good adhesion to many materials. It has a 200% elongation rate and a tensile strength of 2500 to 3500 p.s.i. The resin has been successfully used to face drop hammer dies for multiple stamping of metal panels. It is also termed an ideal compound for potting and sealing, and is an efficient and economical replacement for rubber or plastisol in gaskets and other applications.

Maraset casting resin #650 is a low-irritant formulation said to combine the desirable characteristics of rigid and resilient epoxies in a single resin system. It has a hardness of Rockwell M-100, ultimate compressive strength of 40,000 p.s.i., elongation rate of between 3 and 5%, and an impact strength of 7 ft.-lb./in. unnotched Izod. The resin is furnished in opaque colors for tool and die applications and in clear for models, prototypes, and housings.

Terpene oxides. Two novel epoxy compounds, dipentene monoxide and alpha-pinene oxide, are being offered in experimental quantities by Becco Chemical Div., Food Machinery & Chemical Corp., Buffalo, N. Y. Both are suggested for use as intermediates in the manufacture of plasticizers, protective coatings, insecticides, bactericides, lubricant additives, adhesives, flotation agents, perfumes, flavorings, and pharmaceuticals; as reactants in organic synthesis; and as solvents.

Dipentene monoxide combines the reactivity of any epoxy group with that of an olefinic double bond in a cyclic terpene molecule. Alpha-pinene oxide combines the reactivity of an epoxy group with that of the bicyclic system of alpha-pinene.

Metal-plastic shield. A lead-epoxy compound, designated Leadcast, and a method for precision molding and casting of the material have been announced by Telectro Industries Corp., 35-18 Thirty-seventh St., Long Island City, N. Y. Hardness of Leadcast (containing up to 95% lead) can be controlled from that of a rubber-like material to that of cast aluminum.

Applications are primarily in the field of radiation shielding in source containers, instrument housings, interlocking bricks for temporary or removable shielding, tiles, etc.

Epoxy foam. Prefoamed blocks of epoxy resin are now available in sizes up to 1 by 2 by 6 ft. and in densities from 5 to 20 lb./cu. ft. from D & R Pilot Plants, Inc., Hazardville, Conn. Called DuRafoam, the foams are said to be easily machined and to have compressive strengths of from 50 p.s.i. at the lower densities to about 1000 p.s.i. at the higher densities. Recommended uses are for check fixtures, templets, and models.

Expansion

Bakelite Co., a Div. of Union Carbide and Carbon Corp., announces plans for the erection of four additional buildings on the site of its Plastics Research and Development Center now being constructed at its Bound Brook, N. J., plant. Expected cost of the addition is $900,000.

Three of the proposed buildings, a Process Research Laboratory, a Radiation Laboratory, and a High Pressure Laboratory, are destined for Middlesex Borough, and the fourth, a Development Pilot Plant Building, will go into the Piscataway Township portion of the plant site. Bakelite's still growing Plastics Center straddles the boundary of the two communities.

The addition of the four buildings with a combined area of over 77,000 sq. ft. will bring to seven the number of buildings in Bakelite's construction project and will increase the over-all total of new floor space to approximately 371,500 sq. feet. Completion of the buildings is expected in the fall of 1957 and the spring of 1958.

The Dow Chemical Co. announces that its new plant for commercial production of styrene-butadiene latices is now in operation at the Western Div. in Pittsburgh, Calif. Cost of the plant, under construction since early 1956, was in excess of $1 million. This is the fourth Dow latex supply point; the others are located at Midland, Mich.; Velasco, Texas; and Sarnia, Ont.

Atlantic Research Corp., Alexandria, Va., announces plans for the construction of new, modern million-dollar offices and research laboratories early in 1957. The structure, comprising an area of 60,000 sq. ft., will be located on a 40-acre site less than eight miles from Washington, D. C.

The firm, founded in 1949 as a consulting research organization, does both fundamental and applied research and development. Industrial contracts currently in progress include projects in applied polymer chemistry, special instrument development, etc.

Monsanto Chemical Co. announces plans for a major expansion of its production capacity for phenol at its Monsanto, Ill., plant. The expansion, scheduled for completion in the second half of 1958, will boost Monsanto's phenol capacity by approximately 25 percent.

Dewey & Almy Chemical Co., Div of W. R. Grace & Co., Cambridge, Mass., is building a new



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Here is a doubly critical operation of sheet extrusion and final vacuum forming of impact-proof refrigerator door liners. Quality requirements for these finished liners are high! The raw material must extrude sheets that are easily vacuum formed into complex die shapes. At the same time, cycles must be rapid. The refrigeration end use requirement demands an odor-free styrene. But most important, high vacuum forming temperatures cannot affect basic strength of the finished door liners! These are rigid specs for any material.

In a recent run of 7,350 liners, Lustrex Hi-Test 88B met and exceeded these requirements. Paul Schmidt, Chief Thermoplastic Engineer of the Panelyte Division of St. Regis Paper Co., reports, "Working with extremely complex dies, sheets extruded from Lustrex Hi-Test 88B give us excellent resilience and constant flow regardless of high heat cycles ranging from 350°-500°F. In addition, resultant strength characteristics are maintained at a steady peak level." The finished vacuum formed Lustrex liners also pass the "slam door test"—an over-loaded door slammed shut thousands of times to simulate years of actual use. Performance like this cuts rejects at the assembly level to a fine minimum ... proof again of Lustrex performance and economy.

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Metal-plastic shield. A lead-epoxy compound, designated Leadcast, and a method for precision molding and casting of the material have been announced by Telectro Industries Corp., 35-18 Thirty-seventh St., Long Island City, N. Y. Hardness of Leadcast (containing up to 95% lead) can be controlled from that of a rubber-like material to that of cast aluminum.

Applications are primarily in the field of radiation shielding in source containers, instrument housings, interlocking bricks for temporary or removable shielding, tiles, etc.

Epoxy foam. Prefoamed blocks of epoxy resin are now available in sizes up to 1 by 2 by 6 ft. and in densities from 5 to 20 lb./cu. ft. from D & R Pilot Plants, Inc., Hazardville, Conn. Called DuRafoam, the foams are said to be easily machined and to have compressive strengths of from 50 p.s.i. at the lower densities to about 1000 p.s.i. at the higher densities. Recommended uses are for check fixtures, templets, and models.

Expansion

Bakelite Co., a Div. of Union Carbide and Carbon Corp., announces plans for the erection of four additional buildings on the site of its Plastics Research and Development Center now being constructed at its Bound Brook, N. J., plant. Expected cost of the addition is $900,000.

Three of the proposed buildings, a Process Research Laboratory, a Radiation Laboratory, and a High Pressure Laboratory, are destined for Middlesex Borough, and the fourth, a Development Pilot Plant Building, will go into the Piscataway Township portion of the plant site. Bakelite's still growing Plastics Center straddles the boundary of the two communities.

The addition of the four buildings with a combined area of over 77,000 sq. ft. will bring to seven the number of buildings in Bakelite's construction project and will increase the over-all total of new floor space to approximately 371,500 sq. feet. Completion of the buildings is expected in the fall of 1957 and the spring of 1958.

The Dow Chemical Co. announces that its new plant for commercial production of styrene-butadiene latices is now in operation at the Western Div. in Pittsburgh, Calif. Cost of the plant, under construction since early 1956, was in excess of $1 million. This is the fourth Dow latex supply point; the others are located at Midland, Mich.; Velasco, Texas; and Sarnia, Ont.

Atlantic Research Corp., Alexandria, Va., announces plans for the construction of new, modern million-dollar offices and research laboratories early in 1957. The structure, comprising an area of 60,000 sq. ft., will be located on a 40-acre site less than eight miles from Washington, D. C.

The firm, founded in 1949 as a consulting research organization, does both fundamental and applied research and development. Industrial contracts currently in progress include projects in applied polymer chemistry, special instrument development, etc.

Monsanto Chemical Co. announces plans for a major expansion of its production capacity for phenol at its Monsanto, Ill., plant. The expansion, scheduled for completion in the second half of 1958, will boost Monsanto's phenol capacity by approximately 25 percent.

Dewey & Almy Chemical Co., Div of W. R. Grace & Co., Cambridge, Mass., is building a new



FEWER REJECTS—HIGHER RESIDUAL STRENGTH PROVED

...in production run of Vacuum Formed Door Liners with

MONSANTO LUSTREX Styrene Plastic

Here is a doubly critical operation of sheet extrusion and final vacuum forming of impact-proof refrigerator door liners. Quality requirements for these finished liners are high! The raw material must extrude sheets that are easily vacuum formed into complex die shapes. At the same time, cycles must be rapid. The refrigeration end use requirement demands an odor-free styrene. But most important, high vacuum forming temperatures cannot affect basic strength of the finished door liners! These are rigid specs for any material.

In a recent run of 7,350 liners, Lustrex Hi-Test 88B met and exceeded these requirements. Paul Schmidt, Chief Thermoplastic Engineer of the Panelyte Division of St. Regis Paper Co., reports, "Working with extremely complex dies, sheets extruded from Lustrex Hi-Test 88B give us excellent resilience and constant flow regardless of high heat cycles ranging from 350°-500°F. In addition, resultant strength characteristics are maintained at a steady peak level." The finished vacuum formed Lustrex liners also pass the "slam door test"—an over-loaded door slammed shut thousands of times to simulate years of actual use. Performance like this cuts rejects at the assembly level to a fine minimum ... proof again of Lustrex performance and economy.

Investigate the moldability, strength and economies of Lustrex Hi-Test 88B for your next difficult requirement. Write for complete technical data to Monsanto Chemical Company, Plastics Division, Room 672, Springfield, Mass.

LUSTREX HI-TEST 88-B

MONSANTO

The Plastiscope

half-million dollar pilot laboratory to house equipment and facilities for the storage, distillation, and purification of monomers as well as coagulation and drying.

The new laboratory will quadruple the area the company presently has devoted to piloting operations. Reactor equipment will range from quart size to 300-gal. capacity. The facility will be equipped for both emulsion and solvent polymerization and will include a high-temperature section for polyester, polyamide, and plasticizer research. Operations are expected to start in February 1957.

Haveg Industries, Inc. has installed new equipment in its Wilmington, Del., plant and is now producing an additional 50,000 lb. per day of Haveg 6310 (furane) cement and/or Haveg 4310 (phenolic) cement. Production of these cements was originally started by the company in 1954. Haveg 4310 is a carbon-filled phenolic composition and Haveg 6310 a carbon-filled furane resin. Both are designed for use in the brick lining of tanks and for laying of brick and tile floors in chemical processing areas.

National Starch Products, Inc., 270 Madison Ave., New York, N. Y., has acquired **Granite Board, Inc.**, Goffstown, N. H., manufacturer of wood particle board. **Herbert A. Hermsdorf**, president of Granite Board, will continue in that capacity with headquarters at Goffstown.

The marketing of Granite Board will be consolidated with National's Structural Products Div., which now sells Wood-Lok vinyl emulsion adhesives, contact cements, epoxy resins, and specially designed presses to the furniture, woodworking, and construction industries.

Sylvania Electric Products, Inc., Parts Div., has started manufacturing operations at its recently completed plastics plant in Warren, Pa. The company produces proprietary items, such as radio tube bases and sockets, fluorescent lamp bases, and wiring devices used in the radio, television, and lighting industries, as well as a variety of custom molded plastics for non-electronic industries.

With the completion of the new building, Sylvania's facilities in Warren occupy about 310,000 sq. ft. of manufacturing space. The division carries on additional plastics manufacturing operations at a newly acquired plant in Titusville, Pa.

Catalin Corp. of America plans to build a new laboratory at its Fords, N. J., plant for the development of special chemicals. Cost of construction is expected to exceed $500,000.

Catalin recently entered the fields of anti-oxidants and oil additives. Research in the new laboratory is expected to help in further diversification.

Fiberfil, Inc., Warsaw, Ind., manufacturer of glass-reinforced injection molding compounds, announces completion of a second manufacturing expansion program which doubles its former production capacity. This is the second such project completed within one year. The earlier program, undertaken at the beginning of 1956, also increased plant and equipment by 100%; total growth in 1956 was thus a respectable 200 percent.

A large volume of the firm's production is being used for military applications, but commercial applications are multiplying rapidly.

Jefferson Chemical Co., Port Neches, Texas, jointly owned by **American Cyanamid Co.** and **The Texas Co.**, has started a major expansion of its petrochemicals plant which will triple production facilities for ethylene (a starting material in manufacturing numerous other chemicals), double the plant's capacity for ethylene glycol, and increase by 50% the production of ethylene oxide (starting material for synthetic fibers and other products).

National Lead Co. has started construction of a new addition to its St. Louis, Mo., titanium pigment plant, which will increase its annual capacity by 25,000 tons of titanium dioxide, a white pigment used extensively in plastics and other industries. The expansion is expected to be completed by mid-1958.

This marks the third boost in National Lead's titanium pigment capacity announced in the past two years, the others being a new plant under construction at Varennes, Que., rated at 18,000 tons per year, and a previous St. Louis expansion which added 36,000 tons to annual capacity.

Rezolin, Inc. has started construction of a 3000-sq. ft. office building on its premises in Santa Monica, Calif., to house its general office, western sales division, and administrative functions of the company now located at 5736 W. 96th St., Los Angeles. Rezolin produces a variety of plastic tooling materials.

Avery Adhesive Label Corp., Monrovia, Calif., announces the completion of a $450,000 expansion involving new equipment and the addition of 20,000 sq. ft. for plant and office facilities. The expansion move was designed to broaden the base of Avery's manufacturing operations and to further intensify its quality control and research and development activities.

Deceased

Norman L. Stafford, one of the chief executives of Diemolding Corp., Canastota, N. Y., for the past 33 years, died on November 5, 1956.

Meetings

Plastics groups

January 8: Society of Plastics Engineers, Inc., Baltimore-Washington Section Meeting, Langley



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Now Styron® formulations are available in eleven varied combinations of properties for the appearance and performance you wish to realize.

". . . and the design must be developed for the most efficient manufacturing adjusted to . . . equipment and production methods." **

Styron (Dow polystyrene) is available in a variety of granulations for high-speed automatic molding of designs considered impossible only a few years ago.

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** *Quoted from Jens Risom, I.D.I., Jens Risom Design, Inc., New York, N. Y., statement in Industrial Design magazine.*

". . . the selection . . . of the material to be used is one of the most important decisions he (the industrial designer) makes when planning the design." **

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All Dow plastics are backed by extensive technical service, research and development facilities. Whatever your plastics problem, we will gladly share with you to the fullest our experience and skills. THE DOW CHEMICAL COMPANY, Midland, Michigan.

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Heat Resistant: Styron 683 • Styron 700

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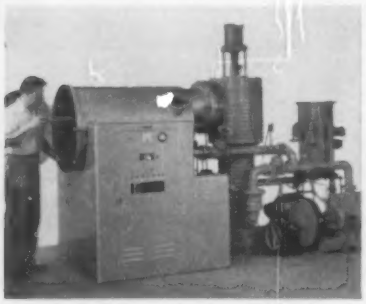
Because vacuum-metallized pieces now can "take it," thousands of products will, for the first time, be finished this new way.

More durable lacquers now protect the superb finishes only vacuum metallizing can produce at low cost. New lacquers and resins now stand up to rigorous abrasion tests and exposure to salt spray and high humidity.

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At CEC, we are ready to help you with a full range of vacuum coaters, headed by a large 48″ model for metallizing large pieces fast and at low cost.

We'll be glad to send you bulletins on our line of coaters, and share our experience in helping you set up operations.



30″ coater—model LC1-30
Typical production: 400 1½″ diameter pieces per cycle; 5 to 7 cycles per hour.



48″ coater—model LC1-48C
Typical production: 1450 2½″ diameter pieces per cycle; 3 to 6 cycles per hour.

Smaller coaters are available for production coating of optics or other small parts, and for laboratory and pilot plant work.

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January 16-18: Society of Plastics Engineers, Inc., Thirteenth Annual National Technical Conference, Hotel Sheraton-Jefferson, St. Louis, Mo.

February 5-7: The Society of the Plastics Industry, Inc., Twelfth S.P.I. Reinforced Plastics Division Conference, Edgewater Beach Hotel, Chicago, Ill.

March 18-21: The Society of the Plastics Industry, Inc., S.P.I. Annual National Conference, Los Angeles-Biltmore Hotel, Los Angeles, Calif.

March 18-21: The Society of the Plastics Industry, Inc., Pacific Coast Plastics Exposition, Shrine Exposition Hall, Los Angeles, Calif.

Other meetings

January 17-24: Independent Housewares Exhibit, Inc., Ninth National Independent Housewares and Home Accessories Exhibit, Morrison Hotel, Chicago, Ill.

January 28-31: Plant Maintenance and Engineering Show and Conference, Public Auditorium, Cleveland, Ohio.

February 4-6: National Combination Storm Window and Door Institute, Inc., First Home Improvement Products Show, Hotel Statler, New York, N. Y.

February 19-20: Chemical Market Research Association Meeting, Sheraton Hotel, Philadelphia, Pa. Theme: "Our Next Five Years of Competition with Foreign Chemical Industry."

March 3-6: American Institute of Chemical Engineers, Meeting, Greenbrier Hotel, White Sulphur Springs, Va.

March 25-27: American Society of Tool Engineers, Silver Anniversary Technical Meeting and Conference, Shamrock Hilton Hotel, Houston, Texas.

March 27-28: Commercial Chemical Development Association, Honor Award and Annual Meeting, Statler Hotel, New York, N. Y.

Companies . . . People

Union Carbide—Bakelite Co.: C. W. Blount appointed vice president—marketing and **J. D. Benedito** vice president—sales. Mr. Blount joined Bakelite in 1924 as a sales engineer; in 1932 he was named assistant sales manager and became vice president and general sales manager in 1944. He was made vice president in charge of sales in 1953. Mr. Benedito joined Carbide and Carbon Chemicals as a sales trainee in 1935 and was transferred to Canadian Resins and Chemicals Co. as sales manager in 1942. He was named division sales manager for Bakelite in New York in 1948, becoming general sales manager in 1956. **G. L. Pitzer,** with Union Carbide since 1933, now vice president of production. Mr. Pitzer started in the South Charleston, W. Va., laboratory and subsequently became superintendent of the Canadian Resins and Chemicals, Ltd. plant at Shawinigan Falls, Que., and assistant superintendent of the Texas City plant. He was transferred to New York to fill the post of works manager for Bakelite in 1952. **Robert F. McAuliffe** assigned as technical representative for the Molding Materials Div., Chicago, Ill. **Nelson R. Smith,** with the firm since 1945, named an associate director in the Product and Process Development Laboratories at Bound Brook, N. J.; **Wallace B. Tibbets** now division leader of the Packaging Div. at the laboratory.

Carbide and Carbon Chemicals Co.: R. K. Turner, a vice president of Bakelite, appointed a vice president of Carbide and Carbon; he will be concerned with plastics operations of both companies. Mr. Turner joined the organization in 1924 in the Research Dept. of Carbide and Carbon at Clendenin, W. Va., and became superintendent of the South Charleston plant in 1940. He was appointed vice president of production for Bakelite in 1952. **R. P. Barry, Jr.** named superintendent of the Chemicals and Plastics Resin plant at Seadrift, Texas, succeeding **Dr. C. M. Blair,** assigned to New York company headquarters. Four technical representatives appointed as follows: **M. R. Carbone** to the Los Angeles district; **J. R. Conaway** to the New York general sales office; **J. A. Francis** to the St. Louis district; and **A. F. Murray** to the Pittsburgh district. Technical representatives transferred from the New York sales office to district offices are: **R. T. Blake** to Cleveland; **J. T. Ferguson** to New York; **L. C. Kranefuss** to Detroit, and **M. M. Maupin** to Houston.

Du Pont—Polychemicals Dept.: Robert Jack Manning named product manager for the company's new Delrin acetal resin; he will supervise the field evaluation and sales development work on Delrin that will be necessary before a final decision is made to manufacture it as a commercial product. **Edwin H. Keller** succeeds Mr. Manning as marketing manager for Tynex nylon monofilament.

Phillips Petroleum Co.—Phillips Chemical Co.: Following appointments made at Bartlesville, Okla., Plastics Sales Div.: **W. L. Fawcett** and **D. E. Setter** named sales service and development engineers under branch manager **M. W. Davidson. P. J. Boeke** now manager of the sales service laboratory branch assisted by group leaders **P. E. Campbell**—evaluation, **Robert Doyle**—extrusion, and **J. N. Scott**—molding. **George Wash** is director and sales manager of the division and **Walter R. Clark** assistant sales manager. **R. Vernon Jones** is manager of technical service and development.

The Dow Chemical Co.: Gordon B. Thayer, with the company for 15 years, promoted to specialist on the staff of Plastics Technical Service. Mr. Thayer spent six years with the Saran Development Laboratory and the past nine years as head of the molding section of Plastics Technical Service. **Leo B. Grant,** manager of the New York office since 1949, named to newly created position of sales manager of the Chemicals Dept. in Midland, Mich.

Celanese Corp. of America: Two members of the Plastics Div. have been honored for pioneer service with the division and its predecessor, Celluloid Mfg. Co. They are **Edward W. Ward,** general sales manager of the division, who has completed 35 years' service, and **Edward H. Miller,** division manager of Sales Development. They received service pins and were guests at a special luncheon given by company officials. Both joined the Celluloid organization following college graduation and remained with the successor Celanese Plastics Div., which was formed in 1941. Mr. Ward has been general sales manager of the Plastics Div. since 1940. Mr. Miller joined Celluloid in 1926 as an accounting clerk.

United States Rubber Co.—Naugatuck Chemical Div.: Walter J. Geldard, formerly plastics sales manager, now marketing coordinator for the division. The Plastics Dept. is now divided into three separate commodity groups, with the following managers: **Edward Geise,** Marvinol vinyl sales; **Richard Malamphy,** Vibrin polyester sales; and **Kenneth O'Keefe,** Kralastic molding materials sales. They report to **Harold Parsekian,** assistant general sales manager of the Plastics Div.

Reichhold Chemicals, Inc.: O. Jay Myers, formerly with Archer-Daniels-Midland Co., named vice president in charge of the Foundry Div. **William T. Marshall** now New Orleans district sales manager. **James J. Odom, Jr.,** appointed director of technical service at Tuscaloosa, Ala.

W. R. Grace & Co.—Polymer Chemicals Div.: Frank A. Connell, formerly with Koppers Co., Inc., now technical representative for linear polyolefin resins. **John R. Davis,** formerly with Shell Chemical Corp., has joined the Baton Rouge, La., polyolefin resin plant now under construction, where he will be affiliated with

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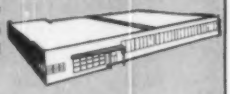




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- Designing and building quality molds.
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Companies ... People

top management. **Leonard F. Swec,** formerly with H. P. Smith Paper Co., named laboratory manager of the Technical Service Dept. in Clifton, N. J.

Emery Industries, Inc.: Albert F. Stahl and **Robert Knippling,** appointed to Process Research Section, will conduct research on both new and existing methods for producing fatty acids and their derivatives. **John V. Killheffer, Jr.,** formerly with Du Pont, appointed to the plasticizer group of the Process Research Section under the supervision of **Dr. C. A. Sprang** where he will work on both new and current plasticizers.

Oronite Chemical Co. has divided its eastern sales region into two sales districts. **E. J. Van Buskirk** appointed manager of the northeastern district, with headquarters at 30 Rockefeller Plaza, New York, N. Y.; **B. W. Colaianni** named manager of the southeastern district, with offices in Wilmington, Del.; **J. H. Selby** appointed manager of special accounts for the eastern sales region; and **J. R. Stitt** will continue to supervise Oronite's eastern regional sales and coordinate the activities of the new sales office.

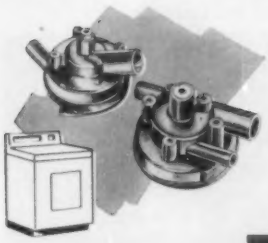
Continental Can Co.: George E. Dyke, formerly chairman of the board and president of Robert Gair Co., Inc., which recently merged with Continental, elected vice chairman of the board of Continental. **C. E. Lawrence,** formerly with Crown Cork & Seal Co., appointed Chicago district sales manager for the Plastic Container Div.

Wyandotte Chemicals Corp.: Three appointments to the Research and Engineering Div. announced: **Sanford Davis,** formerly with Celanese Corp. of America, will study the application of Wyandotte's products in the field of resins and polymers. **Charles E. McClung,** formerly with B. F. Goodrich Chemical Co., will carry out research work in the polymer field. **Seymour L. Axelrood** will be responsible for adapting the company's products to application in the plastics industry.

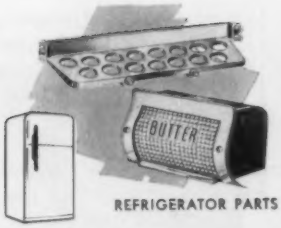
Michigan Plating & Stamping Co., Grand Rapids, Mich., announces that it is negotiating for the acquisition of **Arliss Plastics Co., Inc.,** Brooklyn, N. Y. Arliss produces plastic toys and industrial products; Michigan makes automobile and truck stamping and plating products.

The All India Plastics Manufacturers' Association: B. D. Garware, of Dominion Plastic Industries, Bombay, India, re-elected president; **B. M. Thakkar** and **B. P. Himmatsingka** elected vice presidents; **M. B. Gidwani** and **B. L. Pachisia** elected secretaries.

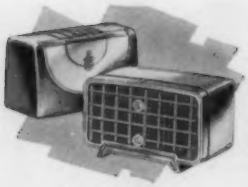
Monsanto Chemical Co.: The Research and Engineering Div. will establish a special laboratory to do research and development work on problems relating to na-



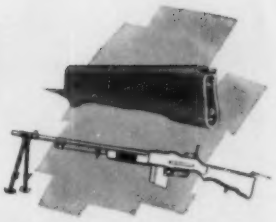
WASHER AND DRYER PARTS



REFRIGERATOR PARTS



RADIO CABINETS



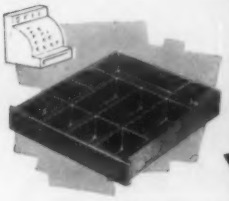
GOVERNMENT WORK



APPLIANCE HANDLES



VACUUM CLEANER NOZZLES



CASH REGISTER DRAWERS



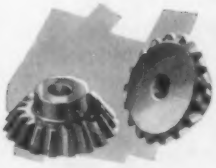
CASTERS



TEXTILE MACHINERY PARTS



TELEPHONE SETS

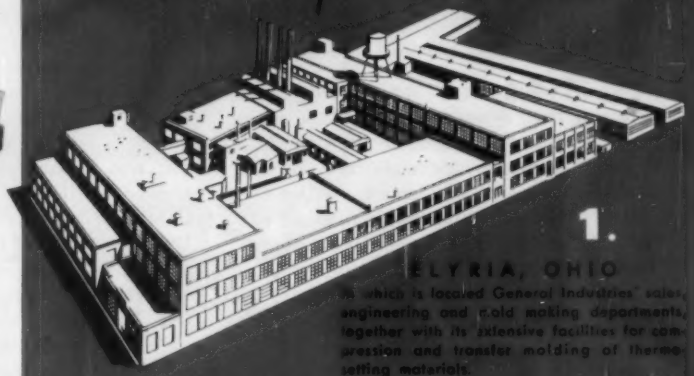


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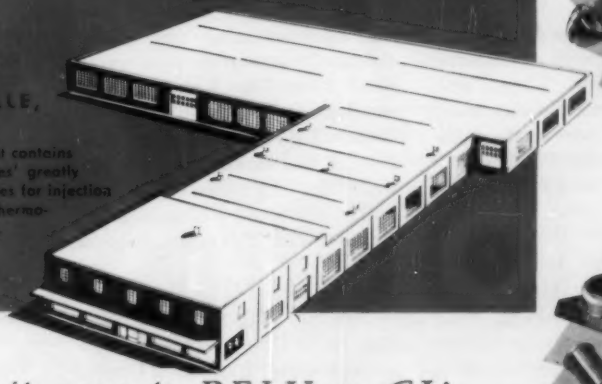
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...which is located General Industries' sales, engineering and mold making departments, together with its extensive facilities for compression and transfer molding of thermosetting materials.

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This modern plant contains General Industries' greatly expanded facilities for injection molding of all thermoplastic materials.



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- **COMPLETE ENGINEERING SERVICE**
- **COMPRESSION MOLDING** 150 presses ranging up to 1850 ton capacity.
- **INJECTION MOLDING** 17 presses ranging up to 200 oz. capacity.
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PLASTIC DIVISION • ELYRIA, OHIO

Companies ... People

tional defense and national welfare which complements its own long range projects. **Herbert E. Morris**, associate director of the Plastics Div., will direct the new group, which will be known as the **Special Projects Dept.** Full operation of the group is expected by the end of 1957.

Overseas Div.: L. L. Baseler, with the company since 1933, appointed assistant director of marketing. **Kenneth R. Stelloh,** with the firm since 1948, now a director of sales. He joins **William R. Haas,** who has been director of sales since 1955. **Arthur M. Moore** named manager of the division's New York district office.

The Hydraulic Press Mfg. Co.: W. H. Bennett, associated with the company since 1939, appointed president, succeeding **John C. Coonley** who has resigned. **E. L. Oehling,** with the company since 1946, promoted to general sales manager, succeeding **W. H. Bennett. R. J. Lindsey,** formerly director of engineering, now vice president in charge of engineering.

Ferro Corp.: Charles H. Fuchsman, formerly with Columbia Southern Chemical Corp., appointed director of development. **John H. Banks,** previously with International Molded Plastics Co., named customer sales manager of the Fiber Glass Div.

Welding Engineers, Inc., Norristown, Pa., and **Robbins Plastic Machinery Corp.,** Elkhart, Ind., have terminated their sales agreement. Welding Engineers will continue to offer its line of machinery and equipment to the plastics and other industries.

Portco Corp.'s Plastics Div., Vancouver, Wash., has purchased **Simpson Logging Co.'s Plastic Pipe Div.,** previously owned and operated by M & M Woodworking Co., Portland, Ore. Production of the full line of plastic pipe is being continued. **Ed Baxter,** formerly head of Simpson's pipe division, now sales manager of Portco's Plastics Div.

Southern Plastics Co., Columbia, S. C.: **Leonard Bogen** named vice president; **Herman Clark** now supervisor of compression molding and fabrication; **Paul M. Branham** appointed supervisor of the Finishing Dept.

Smith Chemical & Color Co., 55 John St., Brooklyn, N. Y., appointed exclusive agent for **Desert Minerals, Inc.,** producer of Desertalc series #50 and #100, used as fillers in thermosetting plastics.

Tel-A-Sign, Inc., Chicago, Ill., has acquired exclusive patent rights to Liquid Light, a specially designed indoor plastic color sign. The sign produces the effect of a continual merger of subdued colors for scenic animation, waterfalls, pouring liquids into glasses, etc. The firm makes a line of indoor and outdoor plastic signs.

T. H. & J. Daniels, Ltd., Stroud, Glous., England, has purchased the manufacturing and selling rights of vacuum forming equipment from **The Latymer Engineering Co.,** 27A Charles St., Barnes S.W. 13, England. Production of the equipment will start soon, and the sales organization will be handled by **Messrs. Alfred Herbert, Ltd.,** Coventry, England.

Nashua Corp. won first award honors in Polyethylene Sheets and Rolls Div. of the 1956 National Flexible Packaging Competition for the packaging of Lady Pepperell blankets for Pepperell Mfg. Co.

Wyrough & Loser has opened a branch sales office in Waltham, Mass., with **William S. Farrell** as branch manager. The company is the exclusive agent for Beech-Nut vinyl acetate resins and emulsions, Dayco rubber processing aids, Georgia Marble calcium carbonates, H. M. Johnson chemical driers and surfactants, Sid Richardson carbon blacks, and Wylox clays.

G. Felsenthal & Sons, Inc.: James G. Felsenthal, secretary and assistant sales manager, elected to the board of directors. **Donald E. Howell,** formerly plant manager of Tiletone Co., named production manager of the Fabricating Div.

Plastics Research Institute T.N.O.: Ir L. C. Stoutjesdijk, formerly director of Plastics Research Institute and Rubber Research Institute T.N.O., has been appointed as the delegate of the president of **National Council for Industrial Research T.N.O.** and at the same time became a member of the board of Plastics Research Institute T.N.O., of Delft, Holland. He will also handle commercial and economic-technical problems of the Council, remaining in close contact with Plastics Research Institute T.N.O. General commercial and economic-technical activities will be directed by the Council's Economic-Technical Dept., supervised by Mr. Stoutjesdijk. Management of Plastics Research has been taken over by **Drs. R. Tunteler** as acting director and **Ir F. W. R. Wijbrans** as adjunct director.

Farrel-Birmingham Co., Inc. has established a European office at Piazza della Republica 32, Milano, Italy. **Sergio F. Tomassini,** former director and works manager of S. A. Luigi Pomini, Italy, is in charge.

Godfrey L. Cabot, Inc. has opened a new sales office at 2023 Davis Bldg., Dallas, Texas, with **Charles M. White** as manager.

Denver Engineering Sales Co., 2720 E. Third Ave., Denver, Colo., appointed regional sales representative for the complete line of insulating tubing, wire, and cable produced by **William Brand & Co., Inc.,** Willimantic, Conn.

Haveg Industries, Inc.: William Reybold promoted to head of estimating and processing; **Dan Whitley** named chief engineer in charge of process design; **Gilbert**

another product improved . . .



chem·o·sol®

puts the ***safety grip*** *in the glove*

Make a good product better with **chem-o-sol**, the plastisol formulation with unique properties!

Shown above is a cotton work glove which Wells-Lamont Corporation of Chicago has converted into a superior, better-selling product through an ingenious application of **chem-o-sol**. This **chem-o-sol** was specially formulated to permit printing on fabrics at high speeds.

Palms and fingers of the gloves are strategically dotted with **chem-o-sol** to give a firm slip-proof grip on any tough job. Flexibility and "feel" are unaffected, while wear-ability is greatly increased.

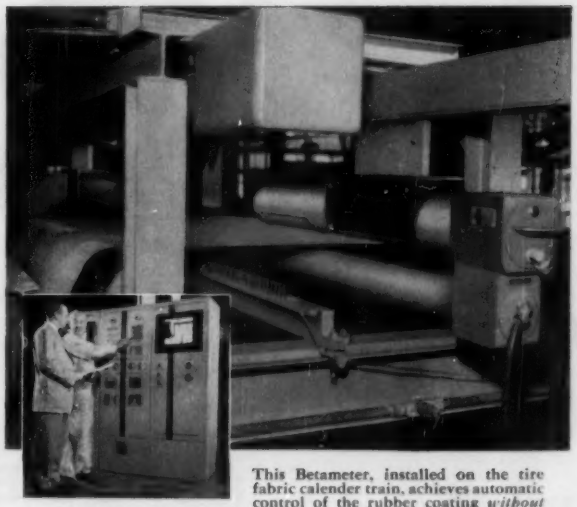
Possibilities for new and improved products through use of **chem-o-sol** are unlimited. This easily manageable liquid vinyl dispersion forms a tough flexible solid with high abrasion resistance. Available in practically any color, it is readily applied in mass production by dipping, molding, spraying, die-wiping, knife-coating or roller-coating.

Our completely equipped laboratories and experienced chemists stand ready to assist you in formulating the *exact* **chem-o-sol** to solve your product problem.

Bulletin 141 tells what **chem-o-sol** *is, how to use it, what it can do for you. Write for your free reference copy today.*

Chemical Products CP CORPORATION

KING PHILIP ROAD • EAST PROVIDENCE, R.I.



This Betameter, installed on the tire fabric calender train, achieves automatic control of the rubber coating *without* contacting the fabric itself. At left is shown R. V. Thomas, Plant Manager, discussing the control console with the calender operator.

THE ISOTOPE PRODUCTS

BETAMETER NOW HELPS GOODYEAR MAKE BETTER TIRES

This unit is installed on a tandem calender in the West Coast plant of the Goodyear Tire & Rubber Company. Twin sets of measuring heads are used on the pass line after each of two calender rolls to obtain more uniform rubber coating on each side of the fabric. "The Isotope Products Betameter offers all of the 'extra' features necessary to dependable automatic control of our calender operation . . ." says Mr. R. F. Snyder of the Akron Design Engineering Department. . . . The unit has a dual source detector combination for point source profile scanning or a distributed source for automatic control using average sample measurement. The null balance circuit permits simpler electronic design for continued accuracy and stability.

. . . The recorder chart is synchronized to the fabric speed thru the calender. The time is independently stamped on the chart for control analysis. The calender roll screw position is indicated on the control console to simplify adjustment.

"Since installing the Betameter control on our calender train, we have made a striking improvement in the control and uniformity of our tire cord gum coating . . . our customers receive more durable and uniform tires at no additional cost for materials or labor . . ." states Mr. R. V. Thomas, Plant Manager. Additional units have been ordered by other Goodyear Plants — outstanding evidence that Isotope Products represent the ultimate in radiation gaging engineering.

Find out today how Isotope Products gaging equipment can automatically control your process. Write for Bulletin R.

Isotope Products

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IBM

Plastics Engineering Opportunities for

No. 1: A Plastics Engineer with minimum 8 years of experience, mainly in thermoplastic production molding. Must be able to supervise mold design and plan production.

No. 2: A Plastics Mold Designer with minimum 4 years' experience in designing plastic molds for both thermoplastics and thermosetting plastic material.

Location: Six months to one year in Kingston, New York, before moving to permanent assignment in Lexington, Kentucky.

No. 3: Plastics Engineer with advanced knowledge of plastics and of transfer compression and injection production molding techniques. Also should be familiar with rubber compounds, adhesives, etc.

No. 4: Plastics Laboratory Technician with some experience in testing plastics desirable. Will assist engineers in technical tasks, conducting laboratory tests and experiments.

Location: Rochester, Minnesota

WRITE briefly, outlining your qualifications and interests, to: R. A. Whitehorne, IBM, Room 8001, 590 Madison Avenue, New York 22, N. Y.

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Companies . . . People

Ricard, formerly of the Estimating Dept., is now in charge of all phases of PVC quoting, engineering, and production; **Earl McDowell,** formerly in sales service, transferred to estimating and processing groups; **Clarence Walls** replaces Mr. McDowell in sales service.

Automatic Molding Machine Co.: George B. Croft named western sales manager. **William D. Price,** Monroe, N. C., appointed southeastern representative. The company produces Automold high-speed, fully automatic compression molding machines.

Heli-Coil Corp.: John E. Fasano named sales manager; **Bayeux B. Morgan, Jr.,** assistant sales manager; **Robert H. Kane,** advertising manager; **J. Laurence Sutton,** manager of customer service.

Bernard W. Lueck, 21 years with **Minnesota Mining & Mfg. Co.,** elected vice president and a director of marketing and sales of **Zenith Plastics Co.,** Gardena, Calif., a subsidiary. Mr. Lueck will continue as general sales manager for the Reinforced Plastic Products Div. of 3M.

Edward E. Heck, former plant manager of Republic Molding Corp., now vice president of **Artag Plastics Corp.,** Chicago, Ill., succeeding **LeRoy T. Kinder,** resigned.

Kenneth H. Beer named executive vice president of **Resolite Corp.,** maker of structural reinforced plastics panels.

Horton Conrad appointed director of sales of **Gering Products, Inc.,** Kenilworth, N. J., supplier of plastic raw materials. He will direct the over-all sales activities of all divisions.

Dr. Nelson V. Seeger, formerly with The Goodyear Tire & Rubber Co., named associate director of exploratory research of **Diamond Alkali Co.,** Cleveland, Ohio. Long active in urethane research,

NOW—YOU CAN PRODUCE FAST-TACKING ADHESIVES

AT LOWER COST WITH BENZOFLEX



Compounders of PVA adhesives are taking advantage of the low cost of Benzoflex 2-45 and 9-88 plasticizers. Low volatility, high solvation, and pleasing odor make the Benzoflexes ideally suited to plasticize polyvinyl acetate for adhesives and paints. If you process polyvinyl chloride into vinyl foam, tile, film, and plastisols, you too can take advantage of the unique properties of Benzoflex plasticizers. Write on your letterhead for experimental samples and technical data.

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NASHVILLE TENNESSEE

A DIVISION OF THE CHEMICAL PAINT AND METALLURGICAL DEPARTMENT OF MERRITT-CHAPMAN & SCOTT CORPORATION

TENNESSEE'S line of top-quality chemicals includes: SODIUM BENZOATE • BENZOIC ACID • BENZYL CHLORIDE • BENZOYL CHLORIDE • BENZOTRICHLORIDE • BENZYL ALCOHOL • BENZYL BENZOATE • TENN-PLAS • BENZALDEHYDE • MURIATIC ACID • ACETIC ACID • METHANOL • BENZONITRILE • BENZOFLEX



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100% PURE

ULTRAMARINE BLUES

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Reckitt's Ltd.

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260 West Broadway

New York 13, N. Y.

Sole Distributor in the United States

Companies...People

Dr. Seeger will have primary responsibility for development and research activities in monomer, polymer, and radiation chemistry.

F. John Pichard now manager, Standard Equipment Sales, of **Wheelabrator Corp.,** Mishawaka, Ind. The company makes plastics cleaning and finishing, as well as dust and fume control equipment.

Joseph E. Johnston, formerly with Richardson Co., named sales representative of **Consoweld Corp.,** Wisconsin Rapids, Wis., for direct sales accounts in the dinette and furniture fields.

John Schmidt, with the company 15 years, elected vice president in charge of sales of **New Plastic Corp.,** Los Angeles, Calif., and its subsidiaries, **Lansco Die Casting Co.** and **Adonis Tile Co.** New Plastic manufactures Nupla soft-face hammers.

Dr. John M. Tome appointed to direct market research and product planning for the Chemical Materials Dept. of **General Electric Co.,** Pittsfield, Mass.

Leonard Greenfield appointed vice president of **Metaplast Process Co.,** Woodside, N. Y., high-vacuum metallizer.

E. Archer Turner, formerly president and director of Read Standard Corp., now a director, a member of the Management Committee, and a vice president of **Baker Perkins, Inc.,** Saginaw, Mich., maker of mixing equipment.

Eugene Sinnett appointed plant manager of **Corrulux Div., L.O.F. Glass Fibers Co.** He was formerly plant production superintendent at the company's Parkersburg, W. Va., plant.

Raymond T. Lahey now in charge of sales of **Admiral Corp.'s Molded Products Div.,** W. Chicago, Ill.

Theodore Schefler, formerly with Commercial Decal, appointed president of **Delaware Printing & Lithograph Corp.,** New York, N. Y., a sales agency for **Kaumagraph Co.,** Wilmington Del. Active in the lithography field for 52 years, Kaumagraph recently developed a printing process for the decoration of melamine foils.

B. Harding Miller named vice president of **George Woloch Co., Inc.,** New York, N. Y. He has been manager of the Akron branch since 1951 and will continue in that capacity.

Roy S. Fisher, with the company 25 years, elected vice president and named director of sales of **National Vulcanized Fibre Co.**

Thomas A. Treleaven appointed supervisor of advertising and sales promotion of **Acheson Colloids Co.,** Port Huran, Mich., manufacturer of 'dag' colloidal dispersions.

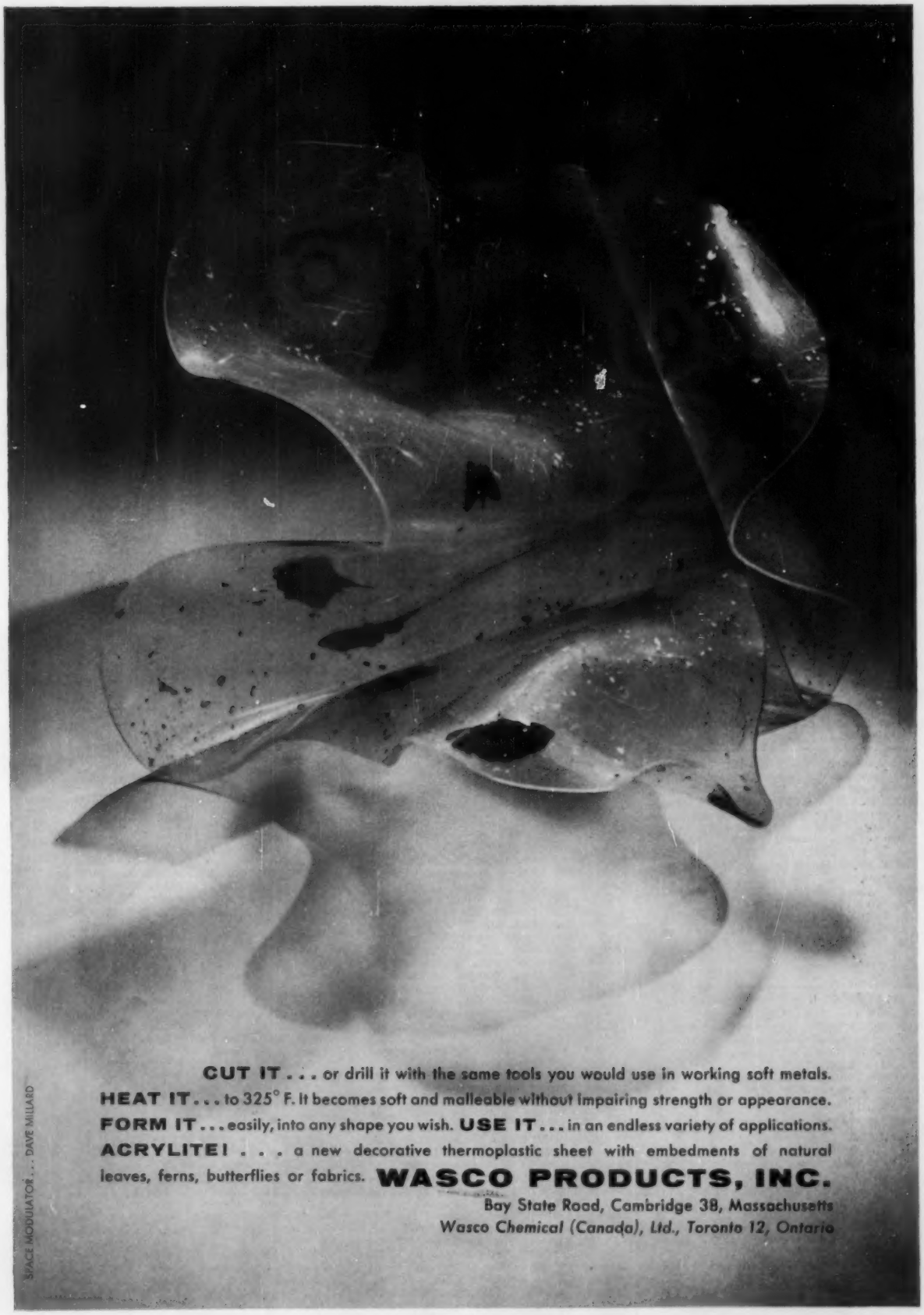
Robert G. Reed appointed business manager of **Escambia Chemical Corp.'s Research Div.,** responsible for business functions and non-technical administration.

Frederick P. Poznick, a sophomore in the Plastics Engineering Dept. at Lowell Technological Institute, Lowell, Mass., has been chosen recipient of a $200 award for plastics study by **DeBell & Richardson, Inc.,** industrial designer.

Robert E. Ringen named sales manager of **Paul O. Abbé, Inc.,** Little Falls, N. J., producer of ball and pebble mills, mixers, blenders, and dryers.

William T. Yost named chief chemist and manager of the research laboratories of **Booty Resineers, Inc.,** Newark, Ohio. Mr. Yost has been instrumental in the development of urea-borate and polyamide resins now being sold by the company.

John E. Lane promoted to Detroit district sales manager for **Fastex Div., Illinois Tool Works.** The division develops and produces engineered stampings and plastic parts used particularly by the automotive, radio, television, and household appliance industries.



CUT IT . . . or drill it with the same tools you would use in working soft metals.
HEAT IT . . . to 325° F. It becomes soft and malleable without impairing strength or appearance.
FORM IT . . . easily, into any shape you wish. **USE IT . . .** in an endless variety of applications.
ACRYLITE! . . . a new decorative thermoplastic sheet with embedments of natural leaves, ferns, butterflies or fabrics. **WASCO PRODUCTS, INC.**

Bay State Road, Cambridge 38, Massachusetts
Wasco Chemical (Canada), Ltd., Toronto 12, Ontario

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FOR SALE: Marco Process consisting of: Homogenizer, Roto-Feed Mixers, Reactors, Kom-Bi-Nators and pumps, all stainless steel. Heavy Duty Double Arm Sigma Blade Mixers. (2) W & P 50 gal. and 100 gal; (4) J. H. Day 5, 50, 75, 200 gal. stainless steel. (2) Kux Rotary Pellet Presses. (3) Horizontal Ribbon Mixers 336 cu. ft. (12,000#) capacity. Stainless Steel Reactors or Autoclaves—1420 gal., 465 gal., ½ gal. (1) St. St. Pug Mill 7" diameter x 3'9" long overlapping chambers, jacketed 75#. (3) Mikro Pulverizers #2TH, #3TH. (3) Fitzpatrick Stainless Steel Comminuting Machines, Models D, K & F. Vacuum Shelf Dryers 85-475 sq. ft. We Buy Your Surplus Equipment. Perry Equipment Corp., 1429 N. 6th St., Phila. 22, Pa.

FOR SALE: 1 Ball & Jewel Grinder Model 300-6, 3 H.P. 1 Foremost Grinder Model 3E, 10 H.P. Reply Box 1737, Modern Plastics.

SPECIAL NEW YEAR SALE: New custom built Hi-Lo Power Units. 7½ H.P. Motor 1200 RPM on 75 Gallon Reservoir, 30 GPM Vol. 3 GPM @ 3000 PSI, with Cooler and All Controls $1500 Guaranteed: other Models to Requirements. (3) HPM 200 Ton Presses. 24"x30" area. 14" Stroke 28" DLO. (2) Watson Stillman Self-Cont. Molding, Transfer Cyls, can be Mounted. 1000 Ton Southwark 64"x64" clear between Columns. 24" Str. 60 DLO. Others on listing avail. on inquiry: Various Pumps in stock for Short Delivery, for any operation. For Presses and Pumps that last, consult us first. Hydraulics Industrial Service, J. F. O'Connor & Son Prop., Renfrew Ave., Elmont, N. Y.

FOR SALE.
Lester type L-2-8 Injection Molding Machine, 8 oz. capacity, complete with instruments. Excellent running condition, immediate delivery. Can be seen in operation.
Sterling Plastics Co.
1140 Commerce Avenue
Union, New Jersey

FOR SALE:

Cutters, Rotary, Plastic: Ball & Jewell Lab. Stainless Steel 1 HP MD; Ball & Jewell Ideal 3 HP, MD; Leominster Model "O" 1 HP, MD.

Die Casting Machines: Loch Engineering, Zinc, Motor Drive 10 HP.

Extruders: NRM 1½" Elec. Htd. Wire Coating, Payoff and Takeup; 1½" Elec. Htd. Laboratory Extruder 2 HP Vari-Drive; Royle No. 1, 2" Screw 15 HP MD; Hartig 2" Elec. Htd. 7½ HP Reliance V-S Drive 98% New; Royle No. 1, 3 Stage Oil Heated, Excellent Condition; Hartig 3¼" Elec. Htd. 45" Barrel 20 HP Reliance V-S Drive; No. 2 Royle 15 HP Motor, 3-¼" Screw, Elec. Htd. Die Head; 4 Zone, Elec. Htd., 4" Screw, 60" Barrel, Practically New; No. 3 Royle 30 HP Motor Drive, 4½" Screw, Side Delivery Q.O.Head; Adamson 6", 4 Speeds 40 HP MD. Strainer Head; Allen Williams 6" Pelletizing Head 60 HP MD.

Injection Molding Machines: 1 oz. Van Dorn Model H-200; 2 oz. HPM No. 54 Clamp 22 Ton, Injection 12 Ton, Manual Controls; 2 oz. Watson-Stillman, Frame 6 oz. Cap., Motor Drive 20 HP, 1945; 3 oz. Fellows Fully Automatic; 4 oz. Dematttia Semi-Automatic; 4 oz. Crown Moldmaster Complete Fully Automatic; 4 oz. Reed Prentice Wheelco Controls 15 HP Md; 6 oz. Watson-Stillman with 2 Wheelco Controls; 8 oz. Reed Prentice Double toggle; 8 oz. Impco Mdl. VF-8, Compress. & Transf. Features, Extra 12 oz. Cyl.; 9 oz. HPM 200 Ton Fully Automatic; 16 oz. Reed-Prentice No. 10-E-16, Elec. Htd. 1948; 22 oz. Impco, Model VF 8-22; 24 oz. DeMattia Model B, Inspect in Operation.

Mills, Rubber, Plastic: 6"x13" Farrel Laboratory 7½ HP MD; 16"x48" Farrel, Rubber/Plastic; 18"x50" Farrel, Rubber/Plastic; No. 2 Abbe Eng. Co., Eureka Porcelain Jar Mill, Roller Chain, Motor Drive (2).

Presses, Hydraulic: I Ton Denison 1½ HP MD; 2 Ton Denison 3 HP MD; 5 Ton, Logan, Twin Ram 7½ HP, MD; 15 Ton, Stokes No. 200D-2 Automatic (10); 15 Ton Consolidated Self Contained; 20 Ton, Elmes No. 3429P Laboratory, Electrically Heated Platens 8"x8"; 25 Ton Consolidated 24"x30" Self Contained Pump & Motor; 30 Ton, Watson-Stillman Laboratory, Platens 8"x8" (2); 30 Ton Watson-Stillman 4½" Ram x 18" Stroke 12½ LR-16" F-B 22" DLO MD; 30 Ton, Baker, Full Automatic Model 958, Excellent Condition, New 1951; 30 Ton, HPM Upmoving 12"x12" Platen 12" DLO 12" Str with Controls; 35 Ton, HPM Down-Acting, Ram 6"x6" Str., Bed 12"x6", DLO 15", Self. Cont.; 40 Ton, Francis 4 Opening, 12"x12" Elec. Heated Platens; 40 Ton, Loomis, 4 opening, 12"x12" Elec. Heated Platens, MD Self-Cont.; 50 Ton, Baldwin-Southwark Angle Molding Press, Practically New; 50 Ton Bliss 20"x20" Platen 20" Str. 60 HP MD; 50 Ton, Stokes, Semi-Auto., Self. Cont.; 50 Ton Farrel 12"x12" Upmoving; 50 Ton, Watson-Stillman, 12"x 17" Elec. Htd. Platens, MD Pump; 60 Ton Weaver Bet. Housings 42"; 60 Ton Elmes Hydr Straightening Press; 75 Ton, Farquhar, Up-Acting, 30"x42" Platens; 100 Ton, Farquhar, Drawing, Stroke 36", Hi-Speed Appr., Press, Return; 100 Ton, Farquhar, Self-Cont., Down Acting Ram 11" x26" Str. 30"x28"; 100 Ton Stokes Standard Semi-Automatic Power System Timing Controls; 100 Ton, Watson-Stillman, Platens 13"x13", Ram 8½"x3" Str., MD Pump; 100 Ton, HPM 72" Str. Platen 30"x30" 84" DLO Fast Acting; 100 Ton, Watson-Stillman, 4-Post, Platens 11¾"x 12", Ram 8"x15" Stroke; 100 Ton, Watson-Stillman, Bed 22"x20", DLO 24", Self-Cont.; 100 Ton, Lake Erie Hi-Speed, 24"x24" Bed, 12" DLO, Self. Cont.; 113 Ton French Oil Mill 6 Opening Elec. Htd. Platens 15"x18"; 113 Ton R. D. Wood 5 Opening Elec. Htd. Platens 14"x20"; 113 Ton Stewart Bolling 20"x20" Steam Platens 12" Upmoving Ram x 14" STR; 150 Ton Stokes Standard Semi-Automatic Power System Timing Controls; 215 Ton Lake Erie Self. Cont. Semi-Auto. Bed 36"x36"; 150 Ton Carey, Platens 20"x16" Adj., DLO 8"-28"; 173 Ton Viceroy Slab-Side 24"x24" Elec. Htd. Platen with Hand Pump; 200 Ton Elmes 14" Ram x 42" Str. 24"x30 Bed; 225 Ton Farrel 4" Ram x18" Stroke L-R 26½" x F-B 24½" 7½ HP MD; 275 Ton Watson-Stillman Upacting 24"x 54" Platens 2-14" Rams; 600 Ton, Watson-Stillman, Hobbing, Motor Driven Pump; 625 Ton, Farrel, Steam Flatens 52"x52", Pump, Mtr., Controls, Under Power; 669 Ton, Morane, 3 Upmoving Rams, 16" Stroke; 750 Ton, HPM, Down Act., Bed 59"x44", DLO 72" Ram 28"x43" Str.; 1200 Ton, HPM, 15 Openings, 100"x120" Steam Platens, Self-Cont. (2); 2000 Ton Birdsboro, Down Actg. Self-Cont. Bed 53"x 144", 2-29" Rams by 30" Stroke; 2400 Ton, Birmingham, Balt Press, 65"x26'6", 24-11" Rams; 4000 Ton Mesta 3 Upmoving 30" Rams x 20" Str. Bed 34"x351".

Pulverizer: Model #W30-H-SP Buffalo.

Furnaces and Ovens: Megatherm, 3/60/220, 3KW, 2-3 Lb. Phenolic Per Min. (3). Despatch Mdl. Diaz-7583, 3 Drawers, 17"x 17"x5" (2); Despatch Mdl. P1hd-8, 8 Drawers, 12x18x2½" (2); Thermonic Induction Heater Model M-285 12 KVA at Full Load; Gehnrich Gas-Fired 6'x6'x6' Walk-in Heat to 400°; Plastics Preheating Oven 2 Door 18 Trays Elec. Htd. to 500°.

Tablet Machines: Model 280-C Stokes 100 Ton Single Punch; Model G-4 Stokes Single Punch Dual Pressure 15 Ton MD; Model R Stokes, Single Punch, Variable Speed Motor Drive, 3 HP; No. RB-2 Stokes, 16 Station, Motor Drive, 2 HP; Model 45 Defiance, 200 Ton, 15 HP, Vari-Speed, MD; Model 61 KUX 30 Ton Single Punch; No. 2 RP Colton, 16 Punch, Rotary, Motor Drive 1½ HP; No. 3 RP Colton, 16 Punch, Rotary, Motor Drive 1½ HP; No. 3 DT Colton 25 Ton Single Punch; Model F, Stokes, Single Punch, MD; No. 5 Arthur Colton, Motor Drive, 3 HP; No. DD-2 Stokes, 19 Stations, US Vari-Drive, 10 HP; No. DDS-2 Stokes, 23 Stations, US Vari-Drive, 10 HP; No. DD-2 Stokes, 23 Stations, Reeves Vari-Speed Drive 7½ HP; Model E. Stokes Single Punch 2 Ton Vari-Speed MD; No. P-3 Stokes 80 Ton Duel Pressure 15 HP Vari-Speed Drive; No. 294 Stokes Dual Pressure 60 Ton 7½ HP MD.

Pumps: 200 CPM, 2500 Psi Worthington Horizontal, Duplex, DA 3¾"x18"; 7½ Gal. Dennison Model PUV 3.75 1000 lb. 3 HP Motor T Tank.

Mixers: 100 Gal. W & P Jacketed Sigma Blades Air Cylinder Tilt; No. 3A Banbury, 150 HP MD Rubber/Plastics; No. 3 Banbury 75 HP MD Excellent Slide Door Construction; No. 3 Banbury 75 HP MD Drop Door Construction; No. 9 Banbury, Body Only; 80 Qt. Reed Vertical 3 Speed HP MD; 100 Gal. Readco Jacketed, Sigma Blades; 500# New Era Single Blade Dough Mixer; 1000# J. H. Day Size D-10 Jacketed Ribbon Blender.

Calenders: 9"x48" American Tool, 2 Roll Doubling, Belt Drive, Rubber, Plastic; 24"x48" Farrel-Birmingham, 3 Roll, 50 HP DC Motor; 14" Web John Waldron 2 Roll Embossing Calender 3 HP Vari-Speed, Never Used.

Take-up Equipment: 30" Royle, Cable Take-Up; 36" Royle, Capstan, Take-Up.

Trimmer: 50 Ton Model Metal Stamping Trimmer Model 1C-¼-6 Fully Automatic.

Impregnators: No. 56 Av. Stokes Vacuum with Storage Tank 29¼" Dial x 42" Vac. Pump; No. 154-1 Barret, Bowl DIA. 18"x8", Cap. 2000 Cu. In. MD.

Paint/Ink Mills: 5"x12") Roll J. H. Day Lab Mill.

Pelletizers: Mitts & Merrill Model 10-N-6 15 HP V.S. Drive.

Reactors: 5 Gal. Patterson-Kelly, Stainless Steel. Elec. Htd. with Agitator. Johnson Machinery Co., 679-P Frelinghuysen Ave., Newark 5, N.J. What Do You Need? What Do You Have To Sell?

(Continued on page 284)



'PERSPEX' acrylic sheet makes the best signs in any language. It is a very handsome material, extremely tough, light and easy to handle, and will stand up to weather conditions in any part of the world.

The advertising display signs illustrated are Canadian, Dutch and Peruvian. 'Perspex' is selling goods all over the world, every minute of the day—and often far into the night. Because 'Perspex' can be transparent, it is ideal for illuminated displays.

'Perspex' is available in clear or opal sheet or in a wide range of transparent, translucent and opaque colours.

Illuminated 'Perspex' sign for 'Esso' Petrol, made by Tek Plastics of Toronto, Canada.

Three-dimensional 'Perspex' sign for Shell at The Hague, Holland. Manufactured by Thermo-Plastics Limited, Dunstable, England.





'Kolynos' Toothpaste sign, manufactured and installed in Peru. The sign is lit internally.

'PERSPEX' *is the registered trade mark for the acrylic sheet manufactured by I.C.I.*

Imperial Chemical Industries Limited, Plastics Division: Export Dept., Black Fan Road, Welwyn Garden City, Herts.

U.S.A. enquiries to : J. B. Henriques Inc., 521 Fifth Avenue, New York 17, N.Y.

Canadian Enquiries to: Canadian Industries Ltd., Plastics Dept., Box 10, Montreal, P.Q.

ICI

P609/0/A

(*Continued from page 282*)

FOR SALE: Two Freas temperature controlled ovens range from 150°F to 500°F. Inside dimensions 19 in. x 19 in. x 19 in. For more information write to J. H. Buckley Dental Laboratories, 406 Century Building, 130 Seventh Street, Pittsburgh 22, Pennsylvania.

FOR SALE.
(3) 4 oz. fully automatic Lesters, new in 1953. Will accept trade-ins on these machines. Also injection molding machines from 1 oz. to 60 ozs. and other plastic equipment.
Acme Machinery & Mfg. Co. Inc.
2315 Broadway, New York, N. Y.
SU 7-1705

FOR SALE: New 64 oz. Injection Molding Machine with Pre-Plasticizer. 750 Ton Clamp. Mold Size 32" Vert. 50" Hor. 8 & 4 ounce Inject. Molders. 300 Ton W. S., Self Contained Compression, Mold 33½"x27"x18" stroke. Watson-Stillman—300 Ton 20"x20"—250 Ton. 28"x24"—140 Ton 22"x16". Waterbury-Farrel 85 Ton 20"x24"—80 Ton 24"x24". 63 Ton 15"x15" with Pull Back Cyl. Lab Presses 10 & 15 Ton, platens 6"x6" or 10"x10". Many others. Accumulators, Valves, Pumps. Aaron Machinery Co., Inc., 45 Crosby St., New York 12, N. Y. Tel.: WAlker 5-8300.

FOR SALE: Stainless Steel Rotary Dryer. Link Belt Co., 5'2"x16". No. 502-16, with all aux. equip. Roto louvre also 6'x24' and 5'x26'. Hersey Stainless Steel Rotary Driers. Reply Box 1728, Modern Plastics.

FOR SALE: 8 oz. Lester; 12 oz. Watson-Stillman. Both machines well maintained and in excellent condition. Complete with instruments. Can be seen in operation. Contact: Mr. Elsasser, Harmonic Reed Corp., Rosemont, Pa. LAwrence 5-4184.

FOR SALE: (11) 75 ton record presses, complete @ $2,450, (11) new 100 ton, 10" ram, 10" stroke @ $1,100, (8) 200 ton, 9" stroke, 14" ram, 36x36 @ $1,850, (7) 200 ton, 9" stroke, 15" ram, 30x30 @ $1,650. (1) 50 ton complete. 18x18 @ $1,850. (1) 200 ton, 16" ram, 30x30 @ $2,450. (2) 200 ton, 16" ram, 42x42 @ $2,850, (1) 200 ton 15" ram, 42x42 @ $2,450, (4) 250 ton, (2) 12" rams, 30x60 rebuilt @ $3,375. Hydraulic Sal-Press Co., Inc., 388 Warren Street, B'klyn, N. Y.

FOR SALE: 1 M P M 1¼" electrically heated extruder; 1 Watson Stillman 50 ton electrically heated molding press; 1 Stokes Standard 150 ton molding press; 7 Cumberland #½ granulators, 3 HP; 1 Cumberland 14" rotary chopper; 2 Stokes model R, T preform presses; also mills, calenders, slitters, etc. Chemical & Process Machinery Corp., 52 Ninth Street, Brooklyn 15, N. Y. Tel.: HYacinth 9-7200.

FOR SALE: 1—Royle #4 Extruder, motor driven; 1—6"x12" Laboratory Mill, m.d.; 1—Ball & Jewell Rotary Cutter, size O m.d.; 2—Baker-Perkins Size 15, 100 gal. Jacketed Mixers: 5—Horizontal Dry Powder ribbon Mixers, 4000#, 1500#, 500#; 1—New 3 Roll 6"x16" Laboratory Calender; 1—Farrel-Birmingham 60" Mill with reduction drive, 150 HP motor, floor level mounting; 1—Fitzpatrick "D" Comminutor, S.S. contact parts, jacketed; 1—Mikro Pulverizer #2th, with motor; 4—Reed-Prentice & W-S Injection Molding Machines , 2-16 oz.; Also other sizes: Hydraulic Presses, Tubers, Banbury Mixers, Mills, Vulcanizers, Calenders, Pellet Presses, Cutters. Send us your inquiries. What have you for sale? Consolidated Products Co., Inc., 50 Bloomfield Street, Hoboken, N. J. HOboken 3-4425, N.Y. Tel.: BArclay 7-0600.

TO SETTLE ESTATE: For sale—flock plant equipment, $1500. M. J. Watson, Crown Flock Co., P. O. Box #536, Sidney, Ohio.

FOR SALE: Lester injection Machines, others. 150 ton Hobbing Press, 50 ton 12"x12" Presses, 100—400 ton, 36"x36" platen Molding Presses. New ¾" 3000 psi Double Solenoid, 4 way Valves. New ¾" 3000 psi Cam operated Valves. Carver Laboratory Presses, factory reconditioned. New 6"x12" Laboratory Mills. Plastic Machinery Exchange, 426 Essex Avenue, Boonton, N. J., telephone DE 4-1615. Cable address "Plasmex Boonton."

FOR SALE: Hartig 3¼" Plastic Extruder. VanDorn 1 oz. Injection Molding Machine. Stokes R, 2½", single punch, Preform Machine, Kux 2½" dia., single punch Preform Machine. Farrel 15" x 36", 2-roll mill. Mills and Calenders up to 84". New Seco 6" x 13" and 8" x 16" Lab. Mixing Mills and Calenders. Plastic and Rubber Extruders. Oxford 57" Slitter. 600 ton laminating press with 23 openings 26" x 36". 300 ton laminating press with 10 openings 40" x 40". Brunswick 225 ton 21" x 21" platens. Farrel 200 Ton 30" x 30" platens. 200 ton Hobbing Press 18"x14" platens. D & B 140 ton, 36" x 36" platens. D&B 150 tons, 24" x 24" platens. Adamson 80 ton, 20" x 20" platens. Farrel 200-ton 20" x 80" platens. W.S. 40 Ton self-contained with 12" x 12" elect. heated platens. Also Lab. to 2000 tons from 12" x 12" to 48" x 48". Hydr. Pumps and Accumulators. Stokes Automatic Molding Presses. Rotary and single punch Preform Machines, ⅛" to 4". Injection Molding Machines 1 oz. to 60 oz. Baker-Perkins & J. H. Day Jacketed Mixers. Plastic Grinders. Gas Boilers. Partial listing. We buy your surplus machinery. Stein Equipment Co., 107-8th Street, Brooklyn 15, New York. Sterling 8-1944.

FOR SALE: 1-12 oz. DeMattia Full Hydraulic Injection Molding Machine. Serial #53-120 H. Purchased new in 1948. 1 Extra Cylinder. December Delivery. $9,500.00, F.O.B. Hillside, N. J. Reply Box 1714, Modern Plastics.

FOR SALE: 1—Cumberland #0 Rotary Cutter; 4—Two Roll Mills 15"x40", 6"x 12"; 2—Baker Perkins 316 SS, 100 gal. and 50 gal. jacketed double arm Mixers; 1—Stokes Model DD2 Rotary Preform Press; 1—Stokes #294 Single Punch Preform Press; 4—Stokes Model R Single Punch Preform Presses; 1—Kux Model 15-25 Rotary Preform Press; Also: Sifters, Banbury Mixers, Powder Mixers, etc., partial listing; write for details; we purchase your surplus equipment; Brill Equipment Co., 2407 Third Ave., New York 51, N. Y.

FOR SALE: Available at bargain prices: Baker Perkins 50 gallon Steel and Stainless Steel Steam Jacketed Heavy Duty Mixers with Stainless Jacketed Blades, motorized power tilting, motor driven. W & P 200 gallon Heavy Duty Mixer, tilting type, with Sigma Blades. J. H. Day from 1 qt. to 150 gal., Imperial and Cincinnatus D.A. Jacketed, Sigma Blade Mixers. Day 15 to 10,000 lbs. Dry Powder Mixers. Mikro Bantam, 1SH, 1F, 2TH, 3TH Pulverizers. Gemco 1000 lbs. 30 cu. ft. Vacuum Double Cone Blender. Day, Rotex, Tyler-Hum-mer, Robinson, Raymond, Gayco, Great Western Sifters. Stokes DD2 and RBB Tablet Machines. Colton 2RP and 3RP Rotary Tablet Machines. Package Machy. FA, FA2, FA4, Miller, Hayssen, Scandia, Hudson Sharp, Oliver Auto. Wrappers—all sizes. This is only a partial list. Over 5000 machines in stock available for immediate delivery. Tell us your machinery requirements. Union Standard Equipment Co., 318-322 Lafayette St., New York 12, N.Y.

FOR SALE: 2 Lewis 4-ounce injection molding presses, serial numbers 187 and 189. One equipped for full automatic molding, the other equipped with IMS Super Heater; 1 Reed-Prentice 8-ounce injection molding press, serial number 18655, with double linkage and 10 D eight cylinder. Presently can be seen in operation. Reply Box 1743, Modern Plastics.

FOR SALE: Vacuum Metallizer 36". Contin. Process Extruding, Vacforming, Blanking op. on 4½" extruder.—Injection Presses: 4,8,24 oz. Reed, 4,9,16 oz. HPM. 6,8,12 oz. Lester, 8 oz. vert. Giddings, 4 oz. Lewis, 1 oz. VanDorn. 4½" NE Extruder. 30" Sheeting Die, 52" Pull-Off.—Conveyors. Apex 2 color Container imprint. mach.—Scrapgrinders, Ovens. Compression & Transferpresses 50 to 600 T. 30 T. Elmes Hydrolair. 2 KW Cutler-Hammer electr. Preheaters.—Auto-Vac 52x30" Forming Mach. Autom. Spray Mask Washer. 1,000 lbs. Paterson Conical Mixer.—All Midwest locations. List your Surplus equipm. with me. Justin Zenner, 823 Waveland Ave., Chicago 13, Ill.

FOR SALE: Giddings & Lewis vertical injection molding machine. 9 oz. x 350. Late model. Excellent condition all safety devices. Price reasonable. Lindberg Products—8050 N. Monticello, Skokie, Illinois.

Machinery and equipment wanted

WANTED.
Would like to purchase, in good condition, used Watson-Stillman 16 & 32-oz. Injection Molding Machines.
Reply Box 1742, Modern Plastics

WANTED: Used 2½" or 3½" Electrically Heated Extruder. Advise as to model, age, condition and price. Reply Box 1741, Modern Plastics.

WANTED: Plastic Machine from 10 oz. down, any make and model. Reply Box 1720, Modern Plastics.

WANTED: To buy or make arrangements for South America of Production equipment of Monofilament/Vacuum Metalization/Rotational Molding or other not very large industries. Interested party will be in USA Dec./Jan. Reply Box 1724, Modern Plastics.

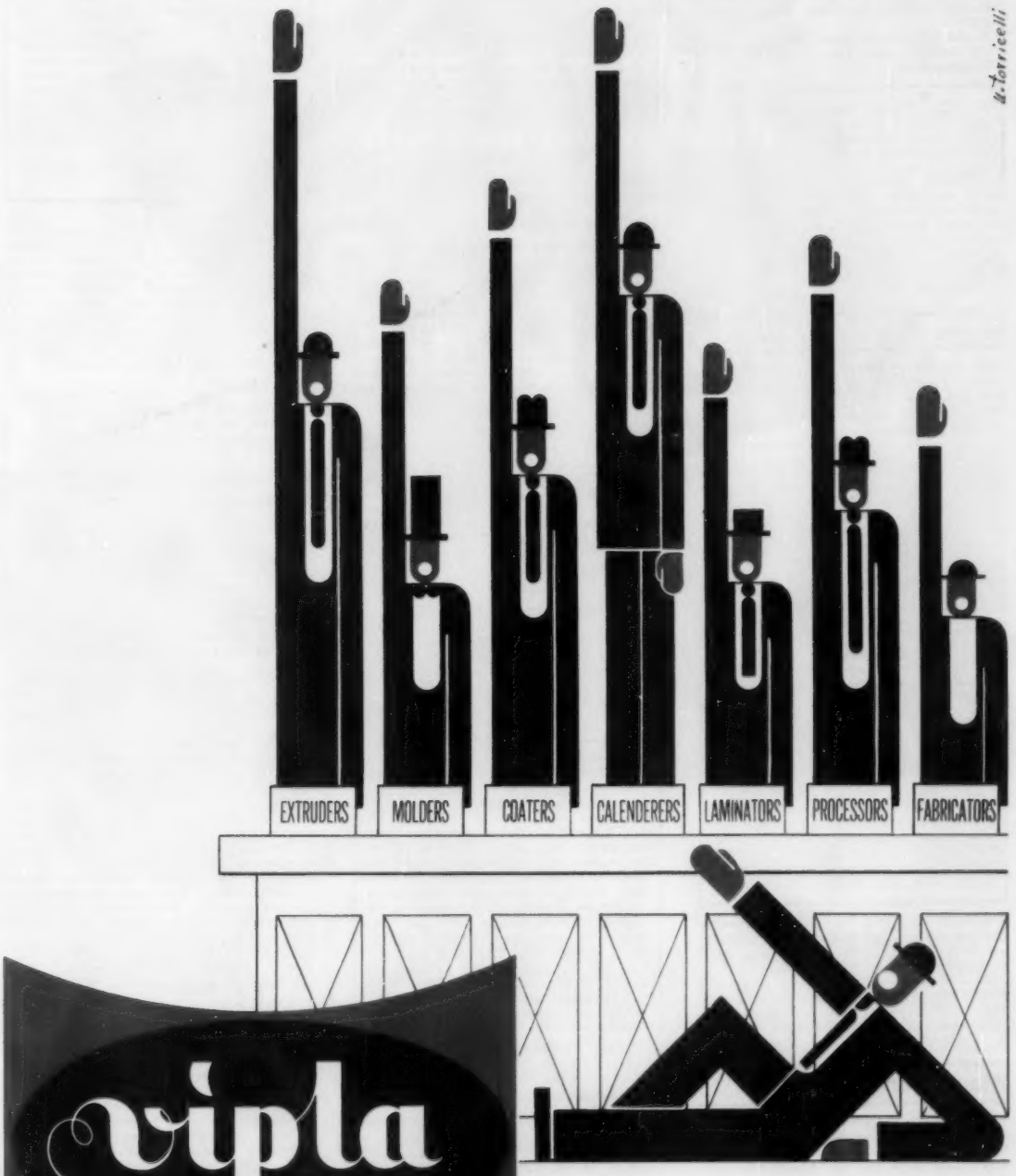
Materials wanted

WANTED: Plexiglass and Lucite scrap, salvage and cut-offs, any quantity. Turn your surplus sheet stock into cash. Ask for our quotation. Duke Plastics Corp., 584 Broadway, B'klyn 6, N. Y. EVergreen 8-5520.

PLASTIC SCRAP WANTED: All types and grades, any quantity. Write or telephone, Success Plastics Recovery Works, Inc., Post Office Box 506, Indianapolis 6, Ind. Phone Liberty 6-2919.

WANTED: Export to Argentina: Argentine importer will visit New York in the month of Dec.-Jan. to Buy Recovered Material/Used and/or remnants of manufacture of virgin material of Thermoplastic Material, for immediate shipment and to set up arrangement for continued delivery. Note also related offers with other combines, be they installations of plastic industry or sale of material. Reply Box 1723, Modern Plastics.

(*Continued on page 286*)



vipla

A MONTECATINI PRODUCT

PVC RESIN

PROMPT DELIVERY FROM STOCK IN U.S.A. AND CANADA

CHEMORE CORPORATION

21 WEST STREET, NEW YORK 6, N. Y. TEL.: HA. 2-5275

(*Continued from page 284*)

WANTED.
Plastics Scrap and Rejects of all kinds. Ground and unground. Also rejected molded pieces and surplus virgin molding powders. Top prices paid.
A. Bamberger Corporation
703 Bedford Ave., Brooklyn 6, N. Y.
MAin 5-7450

WANTED: Plastic Scrap. Polyethylene, Polystyrene, Acetate, Acrylic, Butyrate, Nylon, Vinyl. George Woloch, Inc., 601 West 26th Street, New York 1, N. Y.

WANTED: Argentine importer buying small or large consignments of used, waste or remnants of polystrene, polyethylene, acetate, vinyl or nylon manufacture. Uniquely clear trade and good working conditions. Offers and samples to R. Grabenheimer, Monroe 2385, Buenos Aires, Argentina.

Molds for sale

FOR SALE: Complete line of Houseware Molds, Comb Molds, also some novelty and specialty items. No reasonable offer refused. Send for list. Reply Box 1736 Modern Plastics.

FOR SALE: Injection molds for housewares and containers, fit all 8 and 12 ounce machines. For list and prices Reply Box 1722, Modern Plastics.

FOR SALE: Complete infant toy line. All molds and assembly fixtures to make four large pull toys and one novelty item currently on market and doing $225,000 per annum. Going out of toy business. Reply Box 1702, Modern Plastics.

Molds wanted

WANTED.
A long established and very experienced firm of British Injection Moulders would like the use of Molds of fast selling lines on Royalty basis for British and European markets. Advertisers operate modern plant (principally 10D Reed-Prentice) with excellent sales connections in consumer and industrial fields. First class credentials; paid-up capital ¾' million dollars.
Reply Box 1708, Modern Plastics

WANTED: Molding Dies for Ball Knobs, Control Knobs, etc. Send full particulars, prices and samples to: Rogan Bros. 8031 N. Monticello Ave., Skokie, Ill.

WANTED: Plexiglass cut-offs and salvage. Highest prices paid. Aristocrat Plastics, Inc., 23 Sussex Avenue, Newark, N. J.—MArket 3-5188.

Plants for sale

FOR SALE: Complete operating plant manufacturing Translucent reinforced fiberglass shatterproof panels for windows, skylights, partitions and awnings. Production capacity is 1,890 square feet, (or 45 sheets at 144"x42") per 8 hour shift with six employees. Equipment includes a patent pending fiberglass mat impregnating machine which eliminates costly hand layup that is prevalent amongst competitors. Equipment includes two automatically controlled circulating gas ovens, mixers, chemical balances, Trimming facilities and molds to make a complete excellent quality product in all standard flat and corrugated panels. Floor space required is 2,000 square feet. Price $20,000 includes formulations. Will consider leasing plant or selling stock to an interested active sales organization. Write to: Dipcraft Mfg. Co., 4830 Hatfield St., Pittsburgh 1, Pa.

FOR SALE: Injection molding plant well located in metropolitan Milwaukee; Brick and concrete block building, 10,000 sq. ft. area; three years old. Two or three eight ounce molding machines and related equipment. Proprietary products and molds and tools also available. Reply Box 1709, Modern Plastics.

FOR SALE:
A complete, fully equipped and operating Urea Plastic Molding Compound Plant. Eastern location. Capacity over 250,000 lbs. per month. Railroad siding; acreage. Excellent opportunity as a captive plant.
Reply Box 1745, Modern Plastics.

Help wanted

PLASTICS ENGINEER: For established custom injection molder in Midwest area, with sales ability and full understanding of injection molding and machines, and able to design and estimate molds and production cost. State age, experience, and salary desired. Excellent opportunity awaiting man with best qualification. Reply Box 1740, Modern Plastics.

PLASTIC MOLD DESIGNER: Practical man for top injection molding company on Long Island. Do complete, accurate piece part drawings, supervise & expedite outside Mold Makers on mold design and construction. Oppty. for advancement to estimating part and mold costs and all engineering. Reply with full resume & salary requirements to Box MP 1613, 125 W. 41, N. Y. 36, N. Y.

PRODUCTION FOREMAN: Man to take complete charge of small proprietary compression molding department. Must be able to maintain machinery, make mold changes, and assume full responsibility for personnel in both molding and finishing departments. Chicago area location. Reply Box 1744, Modern Plastics.

PROJECT LEADER.
M.S. or Ph.D. in Chemistry or Chem. Engineering. To plan and carry out Research and Development work relating to the combination of plastics and paper by coating, impregnation, extrusion, and lamination. Also, to devise new and improve methods of imparting barrier properties onto paper. Three to five years experience in paper coatings are required. A thorough knowledge of polymer chemistry and paper-coating equipment is essential. This new and expanding research facility presents an excellent opportunity to grow with the organization. Send details of education, experience, and personal data to:

Director of Research
West Virginia Pulp and Paper Co.
Mechanicville, N.Y.

SALES ENGINEER: Web processing machinery. Experience in paper, plastic, or textile converting operations desirable. Age 21 to 40. Location middle eastern seaboard. Salary commensurate with qualifications. All replies will be held strictly confidential. Reply Box 1739, Modern Plastics.

PLASTICS PLANT MANAGER: Progressive corporation in Chicago area has executive position for qualified man with extrusion or injection experience. Individual's personality as well as mechanical ability will be considered. Applicant having good experience background would be trained for this position. All replies will receive full consideration and be held in strictest confidence. Excellent potential. Salary open. Reply Box 1746, Modern Plastics.

PLANT SUPERVISOR.
Unusual Opportunity to join executive staff of one of America's progressive plastic manufacturers for man experienced in the extrusion of Polyethylene Layflat Tubing. Proven ability to handle men and maturity in thinking are necessary qualifications. Salary commensurate with ability and experience. Excellent future—many additional benefits. Relocate in beautiful, peaceful, and healthful Connecticut River Valley—ideal setting for better family living. Replies held in the strictest confidence. Send resume direct to:
President, Deerfield Plastics Co., Inc.
South Deerfield, Mass.

PLASTICS ENGINEER: For supervisory position in new plant of reinforced plastics fabricator. Must be experienced in quality production of large components, estimating, purchasing. Excellent opportunity for versatile man with rapidly expanding company on middle east coast. Replies held strictly confidential. Please send complete resume and salary desired. Reply Box 1738, Modern Plastics.

ADHESIVE CHEMISTS.
Mexico and South America.
We require several persons who have a broad experience in the formulation and manufacture of water based adhesives, particularly with vinyls and other resins in water emulsion form to do development work. These are unusually good opportunities in a new phase of our development of new products. Persons would have training in the United States and then be assigned in Mexico and South America. Excellent starting salary, benefits with a progressive, growing company in a stable industry. Send resume, recent photograph, and salary requirements to:
E. T. Harding, Corn Products Refining Co., 201 N. Wells St., Chicago 6, Ill.

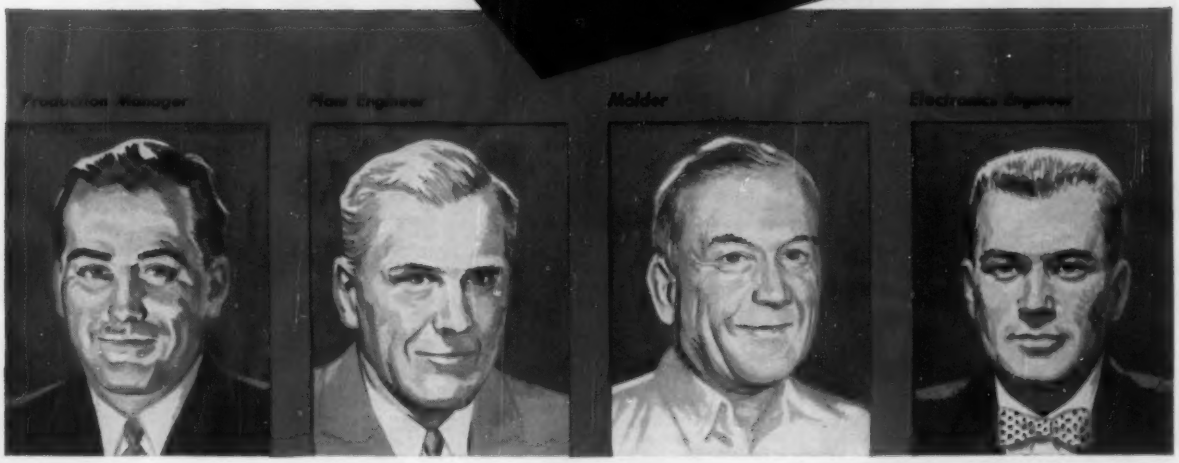
VINYLS: We have an exceptional opportunity for a chemical engineer with two-five years' experience in application research in processing, compounding and formulating of polyvinyl chloride composition. We prefer experience in calendered plastics, either film or sheeting. A familiarity with pilot plant and manufacturing operation is desirable. This is a career opportunity with the oldest manufacturer of floor and wall coverings in the country, with liberal employee benefits; a nationally known, multi-plant, progressive organization. Write with full resume including salary desired to Warren F. Bietsch, Congoleum-Nairn Inc., 195 Belgrove Drive, Kearny, New Jersey.

REINFORCED PLASTICS ENGINEER: Prefer man with chemical or chemical engineering background for opening in development and project engineering group on government and consumer products. Permanent position with excellent advancement opportunity and employee benefits in leading company in the reinforced plastics field. Send complete resume including salary requirements to: Manager Salaried Employment, The Brunswick-Balke-Collender Company, Marion, Virginia.

TILE ENGINEER.
Vinyl tile Engineer or chemist required for new plant. Must have at least two years experience. Excellent opportunity for professional development. Salary commensurate with ability and training.
Reply Box 1705, Modern Plastics.

(*Continued on page 288*)

what advantages do you gain with ATLAC Polyester Resin?



No warpage, faster production

"We had a high percentage of rejects due to warpage. By switching to ATLAC 382 we speeded up our molding cycle, and minimized warpage difficulties. Because ATLAC has a higher heat distortion temperature than most other polyesters, we don't have to wait for the molds to cool before pulling the pieces."

Atlac acid tanks are safer

"Breakage of vitreous and terra cotta acid tanks was a constant hazard in our plant. I suggested ATLAC 382 to my molder for tanks to hold dilute acids. Now, thanks to the high impact strength and acid resistance of ATLAC, we solved one of our big acid-handling problems."

Upgrades conventional polyesters

"When conventional resins don't measure up to a job, we upgrade them by adding ATLAC 382. It's easy to mix resins to the exact consistency needed for the job, and get the properties we want."

Higher heat distortion temperature

"For circuit construction, we wanted laminates that wouldn't buckle or warp when subjected to heat. We chose ATLAC polyesters because of their higher heat distortion temperatures, and get an important extra 50° F. of protection."

Write to Atlas for data and samples.

CHEMICALS DIVISION
ATLAS POWDER COMPANY
WILMINGTON 99, DELAWARE

In Canada: Atlas Powder Company, Canada, Ltd.
Brantford, Ontario, Canada

Since 1948 ... 105 AMOS Molds

(*Continued from page 286*)

FOREMAN—VINYL PRINTING: Experience in Vinyl Printing essential. Knowledge of Plastisol Coating and Embossing desirable. All replies held confidential. Excellent opportunity for right man. Established manufacturer, New England area. Please submit resume to Box 1735, Modern Plastics.

PLASTIC ENGINEER: Rapidly expanding plastic molder seeks project engineer age 25 to 30 with practical experience either in molding reinforced plastics or in vacuum forming thermoplastic sheet. Send your reply to the attention of S. Knight, P. O. Box 857, Cleveland 22, Ohio.

PLASTIC WIRE EXTRUDERS: Good positions in California. Experienced in Commercial and Military Spec. wire. Reply Box 1721, Modern plastics.

PLASTICS ENGINEER.
Capable of developing products and production controls. Knowledge of plastic materials, processing and tooling helpful. This is an opportunity for the right man to join a fast growing injection molding organization. ME graduate or equivalent practical experience desirable. Modern Plant within two hours of Chicago.
Reply Box 1725, Modern Plastics.

WANTED: Working general foremen, extrusion plant, one each, second and third shift. Must be strong leader with proven experience. New plant located north of Boston. Base rate $150 per week, plus incentive, bonus, fringe benefits. Reply Box 1719, Modern Plastics.

POLYETHYLENE BLOWN TUBING & Flat Film Plant Manager: Chemical Engineer thoroughly familiar with technique and plant management. Important managerial position with large Eastern Established Producer. Salary open. Experience absolutely essential. Write fully. Reply Box 1707, Modern Plastics.

DESIGNER WANTED.
Point of Sale. Permanent Displays. Wire—plastic—wood—metal; thorough knowledge quantity production and sources; full or part time. Salary open. N.Y.C.
Reply Box 1715, Modern Plastics.

INJECTION MOLDER: Midwest diversified molder characterized by rapid growth desires man with at least seven years experience in all phases of injection molding practice. Must understand latest modern tooling and equipment for production and finishing of injection molded parts. Reply Box 1747, Modern Plastics.

PLASTIC ENGINEER: Mechanical or Chemical Engineer with Compression and Injection Molding experience, who has the ability to design new molds and molding techniques. Must be capable of doing research and development work. This job requires technical ability and the determination to carry each project through to its completion. Excellent opportunity for a capable man to join a progressive company molding its own products. Midwest location. Write giving full particulars, including salary requirements, in first letter. Reply Box 1711, Modern Plastics.

PRODUCTION MANAGER: Experienced man in Thermosetting molding field. Full knowledge of all phases of molding and finishing required. Knowledge of automatic molding equipment desirable but not essential. Particular emphasis on knowledge of tooling. Progressive firm in Chicago area with excellent future for the right man. All replies held in strictest confidence. Reply Box 1704, Modern Plastics.

FLEXIBLE PACKAGING.
We need a Technical Service field representative with sound experience in polyethylene, cellophane or other flexible packaging films. Opportunity exists for growth with top rated, rapidly expanding national manufacturer. Send complete resume and salary requirements to:
Box 1716, Modern Plastics.

PLASTICS ENGINEER: Plastics Engineer with a background in development and application of thermosetting laminates and molding compositions. The candidate should have experience in the evaluation of materials and be capable of carrying on independent research on new materials. The position offers an opportunity for advancement with a progressive company located in the East. In your answer, please send complete information on your educational and industrial experience, and the salary you require. Reply Box 1700, Modern Plastics.

WANTED: Salesman to sell output of manufacturing company making molded and extruded products of plastics for industrial trade. If interested, please state engineering background, sales experience and age. We are more interested in sales ability than engineering ability. Salary and bonus for successful man. Reply Box 1712, Modern Plastics.

RESIN CHEMIST (PROJECT LEADER): To do development work involving resins in combination with starch products for the paper industry. Should have several years experience in resin reactions, and a sound knowledge of resin chemistry. Large midwest producer of starch products. Excellent salary and benefits. Send resume, recent photograph, and salary requirements to: Box 1748, Modern Plastics.

PLASTICS ENGINEER.
Mechanical or Chemical engineer 0-5 years experience to work in development and extrusion of plastic products with expanding plastics group of new nylon-6 plant. Complete benefit plans, new opportunity and excellent working conditions.
National Aniline Division
Allied Chemical & Dye Corporation
P.O. Box 831, Hopewell, Virginia.

PLASTICS INJECTION MOLDING: Assistant Superintendent to handle 3 shifts. Must be thoroughly experienced in die set-up, trouble shooting and quality control. Excellent opportunity for right man in Southern California. Reply Box 1706, Modern Plastics.

VINYL CHEMIST.
Must be familiar with film sheeting and embossing operations. Experience in wall covering, floor covering or similar products preferred. Must be free to work in Trenton or Boston area. Excellent opportunity. Write giving full details to:
American Biltrite Rubber Company,
Trenton, New Jersey.

Situations wanted

MANUFACTURER'S REPRESENTATIVE: Ten years experience in the Industrial Selling field. Handling only one line and wishes to get into the plastic industry. Would like to represent Custom molders in Thermoplastics, thermosetting Plastics, extruder and fabricator. Working Cleveland and surrounding territory. Reply Box 1734, Modern Plastics.

SALES REPRESENTATIVE: age 29, married with seven years experienced technical color sales to Thermoplastic, Polyester and Epoxy fabricators. Varied background in these same fields. Desires sales of raw materials or sales with manufacturing responsibilities. Present location, Northern Ohio but will consider relocation. Available immediately. Background resume with recommendations supplied by return mail. Reply Box 1732, Modern Plastics.

PLASTICS DEVELOPMENT-MANAGEMENT: Reinforced Plastics, Adhesives, Coatings. M.S. Chem. Eng. plus Business Education. Dynamic personality with proven leadership abilities and sound technical background and accomplishments in development and technical service desires challenging position in California. If you are looking for a man with experience, initiative, and organizational talent, please investigate this situation. Reply Box 1730, Modern Plastics.

REINFORCED PLASTICS CONSULTANT.
Research Engineering Development
Production Design Marketing
MIT graduate, Chemical Engineering, Business and Engineering Administration degrees. Experienced in all phases of reinforced plastics. Available to industrial design, engineering consulting, and management consulting firms; also companies interested in entering, or those having special problems in, reinforced plastics.
Reginald B. Stoops
52 Hoyt St.
Stamford, Conn., Tel.: FIreside 8-0576

MANUFACTURERS REPRESENTATIVE: Experienced technical sales with following to plastisol, organisol, calendaring, extrusion, injection and other vinyl fabricators. Desire to represent stabilizer, plasticizer or other raw material manufactures. Also light equipment manufactures supplying to vinyl industry. Must be exclusive, at least to this industry, in Michigan, Indiana, Kentucky, Ohio. Reply Box 1731, Modern Plastics.

PRODUCTION MANAGER: Plastic Vacuum Forming Plant, experienced all stages of production. Can make models, sprayed metal molds, cast epoxy molds, and set-up machine. Experienced printing, decorating plastics, rigid and flexible. Can train help, supervise production. Have experience building vacuum forming machine and of various attachments needed for particular jobs. Am interested Metropolitan New York area. Reply Box 1726, Modern Plastics.

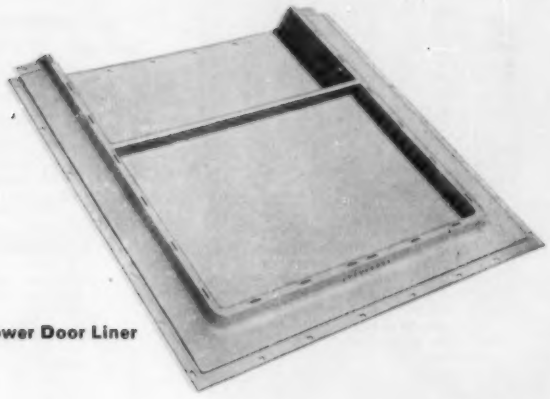
VINYL CONSULTANT.
Specialist in formulations, sponge lined and clear boots, doll parts, toys, balls, automotive parts, coatings, casting specialty items, washers, packing glands etc. Latest processes in rotational, slush and vacuum forming. Automatic and semi-automatic machine designs available. Complete training from model to plant production. No manufacturers represented, sell only services.
Reply Box 1701, Modern Plastics

(*Continued on page 291*)

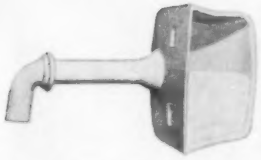
Since 1949...105 AMOS Molds... Millions of Parts for WHIRLPOOL-SEEGER*



Upper Door Liner



Lower Door Liner



Vinyl Drain Cup



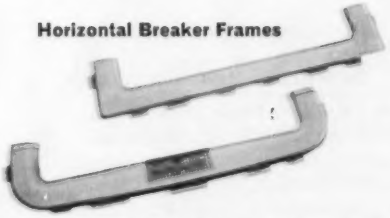
Vinyl Drain Rail



Servi-Shelf



Freezer Chest Door



Horizontal Breaker Frames



Vertical Breaker Frames

* It's more than a story of millions of parts!

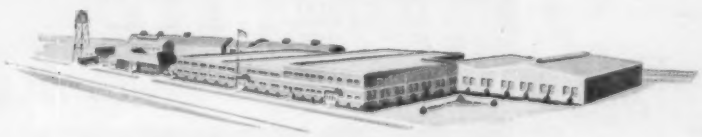
It's a tale of the close teamwork, creative thinking, craftsmanship, and desire to please, that help make up this typical example of Amos service to a valued customer over the years.

It's a story that Amos is extremely proud of, and thanks Whirlpool-Seeger for the privilege of telling.

Perhaps, it's a tale that could be repeated for *your* product . . . with a similar theme of product quality, sales appeal, economy. Why not let Amos engineers review your possible applications now—to find out what plastics can do for *you*. Phone, write or wire:

AMOS MOLDED PLASTICS · EDINBURG, INDIANA
Offices: Chicago, Detroit, New York City, Philadelphia, Kansas City, Mo.

Amos complete facilities: Product Design and Development, Engineering, Mold Building, Molding (4 to 200 oz. capacity), Conveyorized Assembly, Multi-Color Finishing, Vacuum Plating, Silk Screening, Hot Stamping, Roller Coating, Printing, Spray Painting.



In Every Industry . . . for Plastics applications . . . look first to AMOS

Amos
MOLDED PLASTICS...

Custom Injection Molding and Finishing Specialists

Guarantee TOP Performance and Maximum Life!

Specify THESE TOP QUALITY FEATURES...

(Standard on Miller Cylinders at no extra cost)

Specify CASE HARDENED CHROME PLATED PISTON RODS
On all Air and Hydraulic Cylinders

Benefits To You

CASE-HARDENED Piston Rods (52-54 Rockwell "C") provide practically complete protection against damage from hammer blows, wrench-dropping, mishandling, and similar occurrences. ***Available from Miller at no extra cost.***

The HARD CHROME PLATING over the case-hardened rods protects against scratch-damage and rust. ***Available from Miller at no extra cost.***

Specify "TEFLON" WIPERS
On all Air and Hydraulic Cylinders

Benefits To You

"TEFLON" Rod Wipers and "TEFLON" Hydraulic Piston Rod Seals withstand temperatures from—100°F. to plus 500°F. They are impervious to practically all known chemicals, including the fire-resistant, special, and standard hydraulic fluids in current use. ***Available from Miller at no extra cost.***

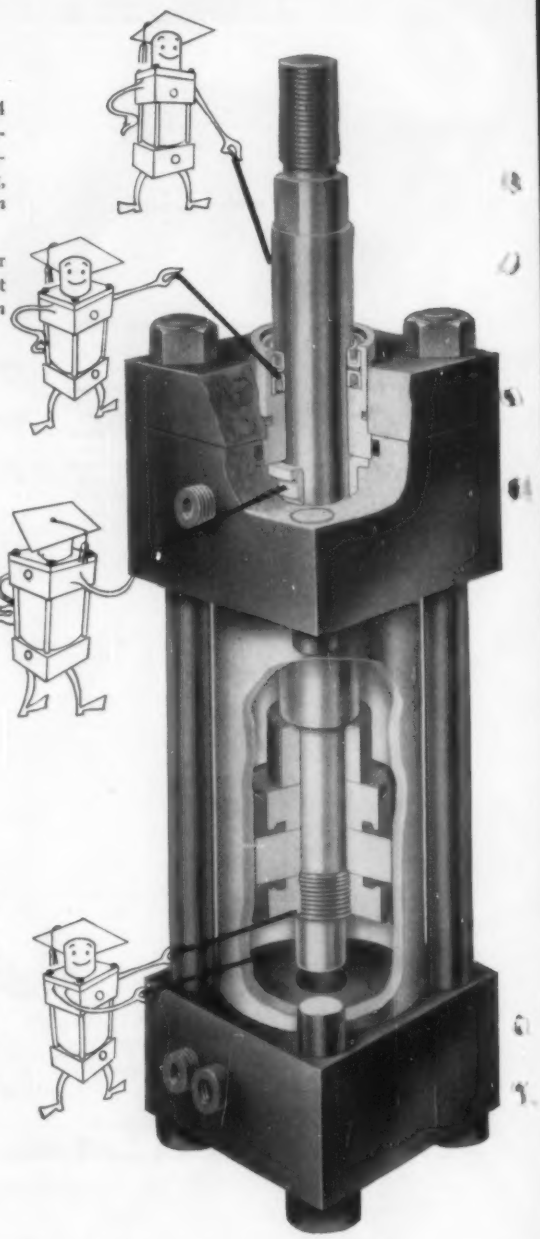
Specify TEFLON HYDRAULIC ROD SEALS
On all Hydraulic Cylinders

Specify RUST RESISTANT SURFACES
On all Air and Hydraulic Cylinders

Benefits To You

Highest quality Black Ferric Oxide Finish provides rust protection in air cylinder operation and on all cylinders during shipping and installation.

Cylinder heads, caps, mountings, pistons, followers, tie rods, and the unplated portions of the piston rods have this finish ***at no extra cost on all Miller cylinders.*** (This finish not recommended for water service)



You may wish to route this entire page to the proper department in your company, by using this handy form. Additional copies on request. →

To (Dept.)_____

"On all our future cylinder requirements, please specify the above quality features."

Signed_____

Title_____

NOTE. On all Miller Hydraulic Piston Seals: Leather Cup Seals are *standard*, Piston Ring Seals are optional at *no extra cost*, and "Teflon" Cup Seals are available *at extra cost.*

Member of the National Fluid Power Association

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Miller

MILLER FLUID POWER DIVISION FLICK-REEDY CORP.

2020 N. Hawthorne Ave. Melrose Park, Ill.

AIR & HYDRAULIC CYLINDERS • BOOSTERS • ACCUMULATORS
COUNTERBALANCE CYLINDERS

(*Continued from page 288*)

REINFORCED PLASTICS ENGINEER: Seeks responsible technical position. Eight years experience in research, development, design, testing, and engineering of fibrous glass reinforced resins. Familiar with all molding methods. Willing to relocate. Reply Box 1718, Modern Plastics.

EXECUTIVE SALES ENGINEER: 10 years field Sales to Industry. Custom Thermo, Thermosetting, Phenolic Laminates and Glass Re-inforced Polyesters. Full experience in all finishing procedures including Vacuum Plating. Also raw material and processing machinery sales to Custom Molders. Located Central Ohio. Desire to remain in this location. Best contacts appliances, aircraft, automotive and Industry Ohio, Indiana, Kentucky. Reply Box 1713, Modern Plastics.

Sales agents wanted

SALES REPRESENTATIVE: On commission basis for well established Custom Compression, Transfer, and Injection molding plant in New England. Desire representation in New York, Philadelphia, and Buffalo area. Reply Box 1710, Modern Plastics.

COMMISSION REPRESENTATIVE: Sought by one of New England's leading injection molding companies. Company offers machines ranging 6 oz.-48 oz., strong engineering force, excellent assembly work, and competitive prices. Write giving full particulars. Reply Box 1727, Modern Plastics.

REPRESENTATIVE now calling on plastic industry to sell Electroformed Injection Molding Cavities, a proven high production technical process. Man we seek should have some experience with molds and mold making. This is a real opportunity to add substantially to your earnings. Commission. State lines carried and territory. Camin Labs., 104-14 South 4th St., Brooklyn 11, N. Y.

Miscellaneous

PURCHASE BUSINESS: Desire to buy Retiring Partner's interest or outright interest in going concern. Active Participation. Reply Box 1733, Modern Plastics.

WANTED: Injection molds—one item or complete line of proprietary consumer articles, also interested in molds for industrial parts such as knobs, handles, fasteners, boxes, etc. Will consider purchasing complete injection plant with end products or parts line. Designers: New items wanted—cash or royalty. Victory Mfg. Company, 1722 West Arcade Place, Chicago 12, Ill.—Estab. 1930.

DESIGN AND DRAUGHTING SERVICES: We specialize in particular, in Molds for Plastics, Compression, Transfer and Injection, also jigs and fixtures. We offer a reliable, speedy and confidential service. We also have facilities to manufacture Molds, Jigs, Fixtures and special purpose machines and equipment. Spotona Ltd., "Watchett Works," Oakhurst Road, Southend-on-Sea, Essex, England.

FRENCH INDUSTRIAL FIRM: Founded in 1920, highest references, is seeking licenses for fabrication of products and articles of top quality. Write No. E.3.751 Contesse & Cie, 8, square de la Dorgogne, Paris 17, who will transmit.

NEW PRODUCT IDEA AVAILABLE: Truly revolutionary, this silverware rack is an entirely new idea, can be simply molded, provides the ultimate in convenience, is destined for use in every kitchen. This appealing, useful invention available to injection molder-merchandiser with large distribution facilities. Originator wants payment on royalty basis. Patent applied for September 1955. Reply Box 1729, Modern Plastics.

All classified advertisements payable in advance of publication

Closing date: 28th of the second preceding month, e.g., December 28th for February issue

Up to 60 words $10.00	Up to 120 words $20.00	Up to 180 words $30.00
Up to 60 words (boxed) $20.00	Up to 120 words (boxed) $40.00	Up to 180 words (boxed) $60.00

For further information address Classified Advertising Department, Modern Plastics, 575 Madison Avenue, N. Y. 22, N. Y.

Celanese's
PLASTICS RESEARCH
Opens Up New Opportunities for
CHEMISTS

Celanese is moving rapidly ahead in the ever-growing and increasingly important plastics field. To ensure the company's continuing leadership, an expansion in plastics research is underway.

Organic and Physical Chemists with PhD degrees and some industrial experience in polymers will find unusual opportunity for interesting fundamental research, either in study of polymerization mechanisms or in synthesis of new polymers and organic compounds capable of polymerization.

A position in Celanese's Research Laboratories provides the scientist with a permanent career in a progressive company which seeks out and rewards individual initiative and achievement. Salaries are based on background and experience.

For an analysis of your qualifications in terms of the positions now open, please write complete details of your education, experience and salary desired to Mr. G. M. Hewitt. All inquiries, of course, will be kept confidential.

Celanese
CORPORATION OF AMERICA
Morris Court Summit, New Jersey

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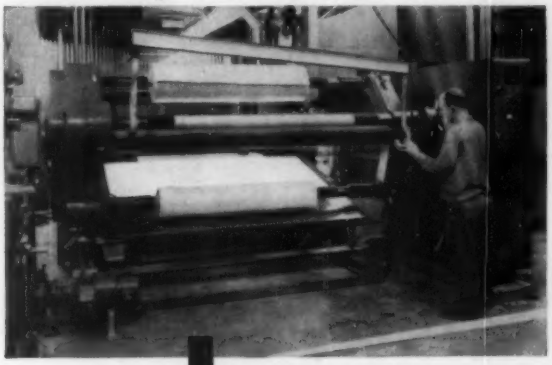
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HOBBS-ALQUIST WINDER

Ideal for Glass Fiber



INSTALLATION FOR LEADING GLASS FIBER MANUFACTURER

The Hobbs-Alquist Winder is ideal for winding glass mat and glass fiber fabrics, as well as other types of textiles, plastics, rubber and paper.

It automatically maintains uniform tension throughout the winding operation — regardless of the size of the roll. Just turn a dial to the tension you want and the Hobbs-Alquist motor takes over. No stretching or distortion! Roll windup as high as 10 to 1!

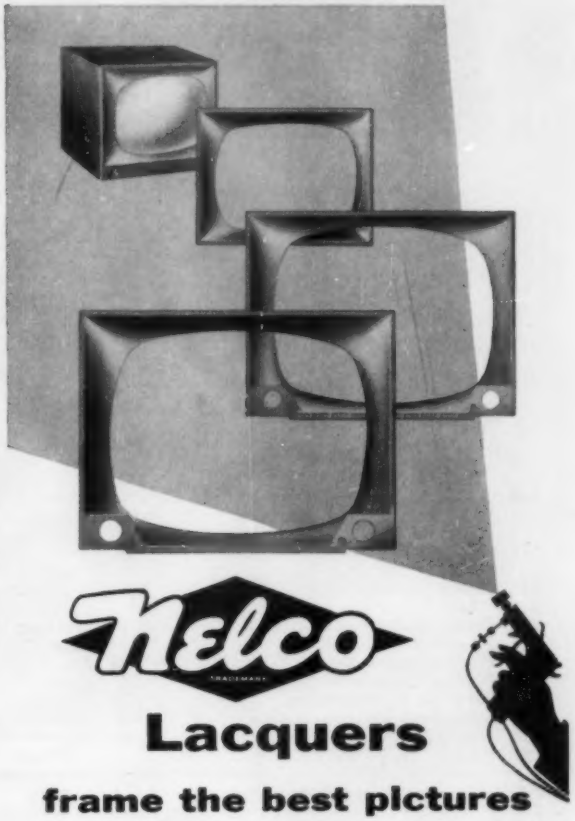
The motor is 3-phase, A. C., flange mounted to a gear reducer — entirely independent of the main machine drive. Power utilization is approximately 2 to 3 times greater than other types of winders. Maintenance is low — no brushes or tubes. Compactness saves floor space. Simplicity promotes cleanliness. No dancer rolls. No supervision.

Find out what the Hobbs-Alquist can do for you.
Send for free booklet — "Hobbs-Alquist Winders — Winding Engineering".



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25-A Salisbury St., Worcester 5, Mass.
Branch Offices & Representatives in Irvington, N. J. Chicago, Cleveland, Greenville, S. C. and Toronto, Can.
WINDERS • SHEARS (Hand & Automatic) • DIE PRESSES SLITTERS

In television . . .



NELCO

Lacquers

frame the best pictures

The lacquer finish on the polystyrene "mask" or frame (shown above) surrounding the picture tube is vital to good TV viewing. Glare and reflection must be reduced to a minimum and colors must blend attractively with the television cabinet.

Here is how NELCO Lacquers serve one major television manufacturer:

The Problem
To lacquer finish black polystyrene "masks", attractively, economically.

The Answer
Production-line, hand-spraying with one coat of flat, fast drying NELCO Polystyrene Lacquer.

The Results
Handsome, no-glare, non-reflective finish.
Scratch and blush resistant.
Excellent adhesion.
Reduction of costs. No-glare lacquer replaces expensive etching of metal molds.

NELCO lacquer formulations are available in all metallic shades for every coating requirement — cellulose acetate, vinyl, acrylic, cellulose acetate butyrate and rubber. Write for complete information on these lacquers and, for our recommendations, just outline your problem to us.

Chemical Products CORPORATION
KING PHILIP ROAD • EAST PROVIDENCE

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MANCO

'TRU-CAST' Beryllium Copper Mold Components Have Everything You Need



- Long Life
- Fidelity of Detail
- High Impact Strength
- Close Dimensional Tolerances
- Trouble-Free Performance

These "built-in" advantages, plus quality guaranteed by over 40 years of Manco casting experience, go into every 'Tru-Cast' cavity and core —adding up to better, faster production at substantial cost savings.

Write, wire, or phone today to bring your production problems to Manco — a copy of the 48-page 'TRU-CAST' HANDBOOK will be sent to qualified firms upon request.



MANCO PRODUCTS, Inc.
2401 Schaefer Road, Melvindale, Mich.
Telephone: Detroit—WArwick 8-7411

Advertisers, Take Note!

The March issue of MODERN PLASTICS will be a truly "special" issue for suppliers who are aiming to build sales on the West Coast.

Here's why. *Two* events of major significance to the plastics field will be staged concurrently in Los Angeles in March: The 1957 SPI Annual Conference and the First Pacific Coast Plastics Exposition.

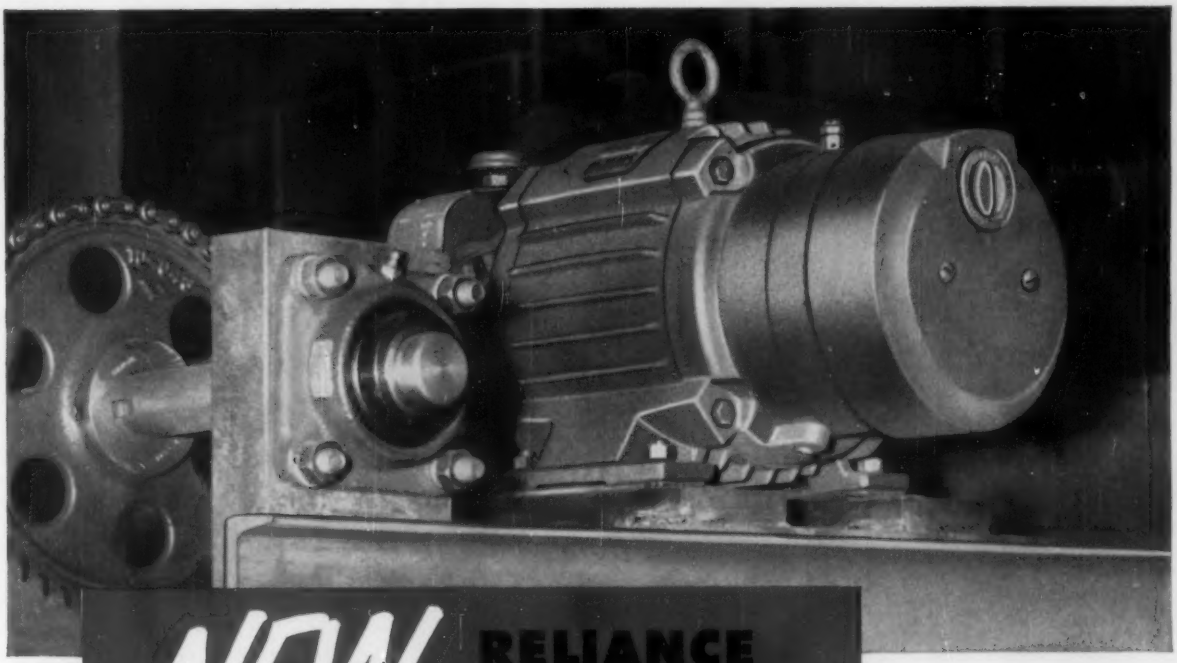
Editorially MODERN PLASTICS will go "all out" to tie in with these events. Feature articles will deal with Pacific Coast plastics developments. There will be detailed exhibit diagrams, schedules of events, attendance rosters.

Circulation-wise, the March issue will provide selective *added* distribution to cover whatever leading plastics-consuming firms on the West Coast that the magazine does not normally reach.

Timing of the issue will be just about ideal. Copies will be mailed to each subscriber before the end of February so that those who intend to go to Los Angeles can use it as an advance guide to both events.

Lowered advertising rates will be in effect for companies electing to limit their advertising to West Coast readers. Regular rates, of course, will apply to advertisers aiming to reach MODERN PLASTICS' full circulation.

For complete details write today to
MODERN PLASTICS 575 Madison Ave., N.Y.C. 22, N.Y.



NEW RELIANCE BRAKEMOTOR

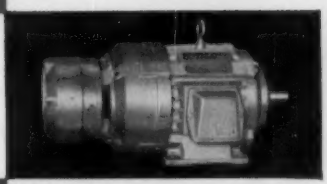
These new motors are specifically designed for tough operating conditions. Corrosion-proof cast-iron housings and sealed joints make this motor impregnable to foreign material.

Braking torque ratings from 3 ft. lbs. thru 345 ft. lbs. Fail-safe mechanism immediately applies brake in case of power failure. One piece molded brake linings provide fast, smooth stops and unmatched holding power for heavy loads.

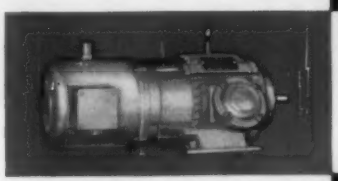
Simple brake has only six parts and requires no control wiring or auxiliary electrical equipment. Compact construction requires a minimum of space. Wearing parts are easily accessible for fast maintenance.

For further information write for bulletin B-2503. B-1032

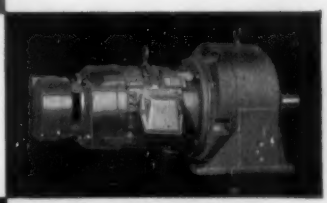
See Your RELIANCE Sales Engineer TODAY



Totally-Enclosed, Corrosion-Proof



Explosion-Proof—Cl. I, Gr. D and Cl. II, Grs. E, F & G



Corrosion-Proof Gearmotor



Protected

RELIANCE ELECTRIC AND ENGINEERING CO.

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New PVC compound stops corrosion!

Discover how rigid polyvinyl chloride pipe, valves and fittings can cut your plant's share of the nation's annual bill for battling corrosion—a staggering $6 billion! You can save on maintenance costs and reduce shutdowns caused by either internal or external corrosion.

Injection molded from a *special, newly developed* DIAMOND PVC rigid compound—the lightweight valve you see above* will resist attacks by weather and a wide range of acids, alkalies, salt solutions, alcohol, and other chemicals.

Easy to install, it's nontoxic, nonsparking and nonflammable. And its smooth inside surface lowers flow resistance and prevents deposit build-ups. Temperature limit for continuous service is 165° F.

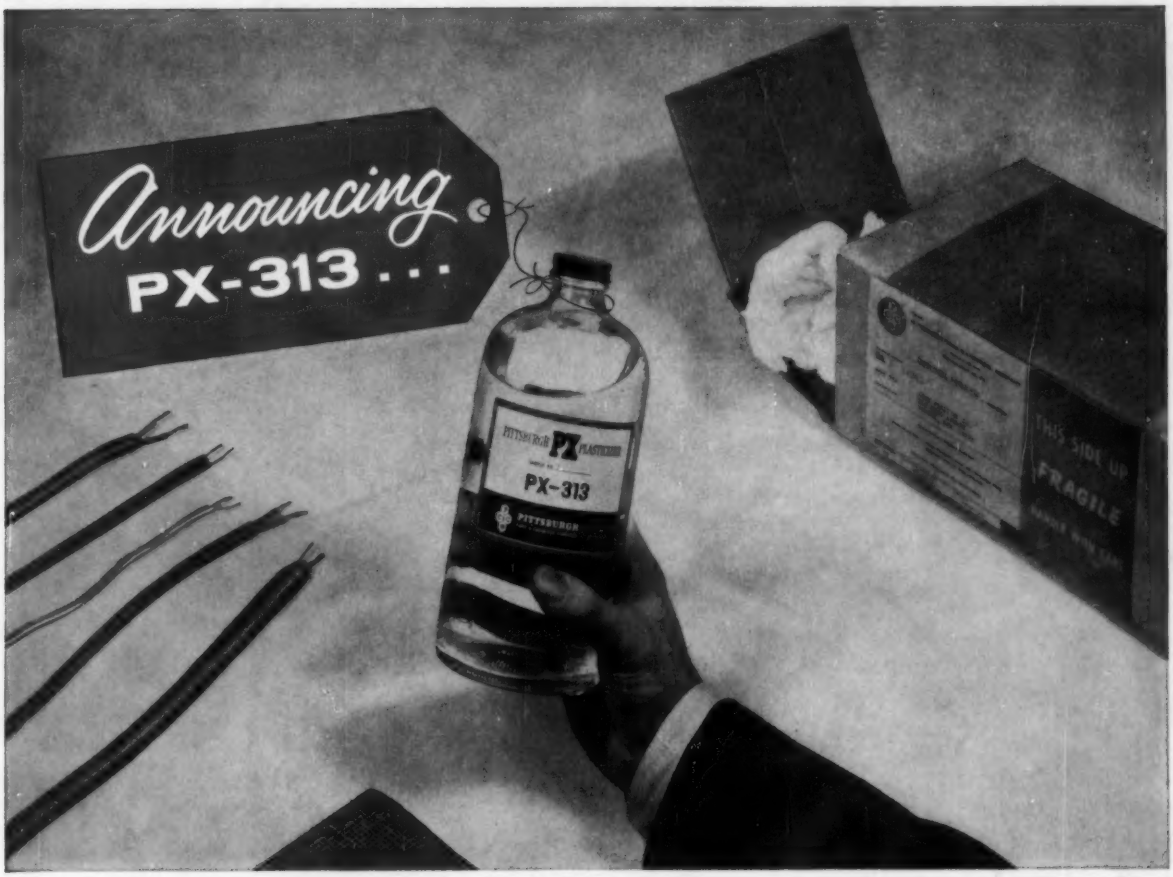
Experience further demonstrates that polyvinyl chloride compounds based on this new DIAMOND development are ideally suited to molding operations.

For full information on this remarkable new rigid compound, call or write DIAMOND ALKALI COMPANY, 300 Union Commerce Building, Cleveland 14, Ohio.

*Produced by Tube Turns Plastics, Inc. Louisville, Kentucky. DIAMOND does not make PVC pipe, valves or fittings.

DIAMOND ALKALI CHEMICALS

Diamond Chemicals



. . . Pittsburgh's New Cost-Saving Low Temperature Low Volatile Phthalate Plasticizer

HERE is a completely new Pittsburgh Plasticizer that may enable you to realize important cost reductions if your production requires a primary plasticizer with excellent low temperature flexibility, low volatility and good processing characteristics.

A modified alkyl phthalate, PX-313 imparts a low temperature flexibility in vinyls equivalent to that obtained with normal octyl-normal decyl phthalates, but at appreciably lower plasticizer cost.

PX-313 is thus ideal for high quality coated fabrics, sheeting and film. Its low volatility and excellent heat stability make it equally suitable for vinyl-jacket wire and other extruded products where elevated processing temperatures are encountered. And because of the good initial viscosity characteristics and excellent shelf life PX-313 provides, it is considered excellent for use in plastisols.

If the economics of this newly developed Pittsburgh Plasticizer seem to offer potential advantages in your operations, we invite you to send for a sample and further data today.

PITTSBURGH *Job-Rated* PLASTICIZERS

PITTSBURGH COKE & CHEMICAL CO.

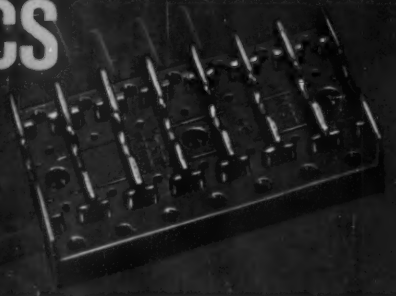
WSW-6395

COAL CHEMICALS • PROTECTIVE COATINGS • PLASTICIZERS • ACTIVATED CARBON • COKE • CEMENT • PIG IRON



1. GENERAL PURPOSE

HOW NEW G-E PHENOLICS HELPED MOLDERS STEP UP PRODUCTION LAST YEAR



2. AUTOMATIC MOLDING



3. IMPROVED IMPACT

. . . and a preview of profit opportunities to come through G-E progress in phenolics

In the plastics field, one fact emerges from 1956 to illuminate the year ahead: increased production and new markets are the molder's surest road to bigger profits.

During 1956, readers of this space saw—and many were quick to take advantage of—new G-E phenolic compounds that emphasize higher output, lower production overhead . . . greater profit potential. Among the new materials announced here were those in the panel shown above.

Look to G. E. for further progress in phenolics—THIS YEAR

Watch this space for announcements of new materials now in final stages of development: *New nodular impact phenolics • New high-heat resistant phenolics • Improved rubber-phenolics.*

These new powders will add another dimension to what is already the most diverse line of phenolic compounds in the industry. If you mold phenolics, there is a G-E compound to fit *your* job.

For more information on the new compounds described in the panel—or on the entire family of G-E phenolics, write General Electric Company, Section MP-1, Chemical Materials Department, Pittsfield, Massachusetts. *See our catalog in SWEET'S.*

1. General Purpose—G. E.'s 12920 (black) and 12921 (brown) have demonstrated these big advantages over previously available grades: greater versatility, better finish, longer flow time, faster cure.

2. Automatic Molding—G. E.'s 12902, a one-stage powder specifically designed for automatic presses, features fast cure, excellent release characteristics, low bulk factor and uniform granulation.

3. Improved Impact—G. E.'s 12906 (black) is a new fast-cure improved impact material that is superior in nearly every application to any known conventional impact compound now available. Excellent preform and preheat characteristics permit fast molding cycles.

Progress Is Our Most Important Product

GENERAL ELECTRIC